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TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY  
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## CONTENTS

PAGE

## MICROBIOLOGY

- Comparative Data on the Use of Kessler and KODA Media in  
Analysis of Washings From Objects in the Environment  
(V. G. Peskov, et al.; LABORATORNOYE DELO, 1977) ..... 1
- A Simple Method for Growing Asporous Anaerobic Microorganisms  
on Flat Media  
(L. A. Somova, et al.; LABORATORNOYE DELO, 1977) ..... 5
- Dry Yeast Hydrolysate Media To Grow Cholera Vibrio  
(Z. I. Vasil'yeva, et al.; LABORATORNOYE DELO, 1977) .... 8

## PSYCHOLOGY

- Critique of Theories on Personality Types  
(K. Platonov; LITERATURNAYA GAZETA, 3 Aug 77) ..... 12

## PHYSIOLOGY

- The Role of the Bimanual Effect in Detection of a Useful  
Signal Against the Background of Interference  
(D. S. Matoyan, A. I. Oganessian; BIOLOGICHESKIY  
ZHURNAL ARMENII, 1977) ..... 21

## PUBLIC HEALTH

- Multiplace Stationary Pressure Chamber for Hyperbaric  
Oxygenation of the Organism  
(T.O. Orynbayev, et al.; ZDRAVOOKHRANENIYE KAZAKHSTANA,  
1977) ..... 26
- Circadian Biocycles  
(M.L. Yefimov; ZDRAVOOKHRANENIYE KAZAKHSTANA, 1977) ..... 29

CONTENTS (Continued)

Page

On The Content of Cancerogenic Substances in Foodstuffs (B.A. Nemenko, et al.; ZDRAVOODKHRANENIYE KAZAKHSTANA, 1977) .....	37
The Composition of Patients' Population and the Time of Their Stay in Internal Diseases Departments of Hospitals in the City of Kiev (P.L. Shupik, et al.; SOVETSKOYE ZDRAVOOKHRANENIYE, 1977).	40
Some Data on the Disease Rate Among Physicians and Paramedical Personnel of Urban Hospitals and Polyclinics Involving Temporary Disability (A.N. Grachev, Ya. G. Vol'finzov; SOVETSKOYE ZDRAVOOKHRANENIYE, 1977) .....	46
Consideration of Proposals, Applications, and Complaints of Citizens at the Public Health Departments (B.D. Reznikov, V.I. Novoselov; (SOVETSKOYE ZDRAVOOKHRANENIYE, 1977) .....	51
Indices and Trends of the Development of Clinical Laboratory Diagnosis at the Present Stage (V.V. Men'shikov, et al.; LABORATORNOYE DELO, 1977) .....	57
Etiology of Occupational Allergic Rhinitis Related to Premanufacture Tobacco Processing and Growing (R. K. Tulebayev, U. Lutfullayev; VESTNIK OTORINOLARINGOLOGII, 1977) .....	64
Cytological and Histological Tests in Diagnostics of Allergic Rhinopathy of Chemical Etiology (G.G. Kruglikov, et al.; VESTNIK OTORINOLARINGOLOGII, 1977) .....	68

MICROBIOLOGY

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COMPARATIVE DATA ON THE USE OF KESSLER AND KODA MEDIA IN ANALYSIS OF WASHINGS FROM OBJECTS IN THE ENVIRONMENT

Moscow LABORATORNOYE DELO in Russian No 9, 1977 pp 555-557

[Article by V. G. Peskov, L. A. Kanover, and L. A. Ustina, Central Sanitary-Epidemiological Station, Medical-Sanitary Administration, Ministry of Civil Aviation]

[Text] The most widespread method of sanitary-bacteriological control used by epidemiological stations and production laboratories is to take washings from the surfaces of stock, equipment, and other objects for detection of enterobacteria. Such analyses contribute 50 percent and more to the sanitary-bacteriological analyses of most laboratories; this is why there is great practical significance in accelerating and simplifying the method for analyzing washings to reveal *E. coli*. A three-stage method using Kessler, Endo, and glucose media is employed for this purpose by most laboratories (1,2), producing a positive reaction after 3 days. The procedure is laborious, and it requires significant expenditure of nutrient media, laboratory vessels, and laboratory worker time. Late acquisition of results means delay in implementing sanitary measures at unfavorable sites. The nutrient media used for quick detection of *E. coli* in washings (3-5) do not have pronounced incubating properties in relation to incidental microflora (especially in relation to the widespread bacteria--the cocci). In this connection bacteriological laboratories need nutrient media for quick detection of *E. coli* in smears which would be easy to use, simple to make, have good elective qualities, and at the same time be distinguished by pronounced inhibitory properties in relation to incidental microflora.

V. M. Kartashova (6) proposed a medium to detect *E. coli* in bacteriological analysis of milk and washings from milking machines. According to the author the medium is distinguished by great electiveness and by differential and pronounced inhibitory properties in relation to saprophytic microflora; the analysis results can be detected on the first day on the basis of changes occurring in the medium.

Using Kartashova's medium as a basis, in 1974 the Dagestan Scientific Research Institute for Production of Nutrient Media developed a dry

KODA\* nutrient medium to detect *E. coli* and other enterobacteria on environmental objects. The dry KODA nutrient medium was tested at the bacteriological laboratory of the Moscow Railway's Railroad Sanitary-Epidemiological Station, where its electiveness in relation to lactose-positive *E. coli* and its inhibitory properties in relation to incidental microflora were confirmed.

The goal of the present work was to comparatively assess two nutrient media--Kessler and KODA--in detection of *E. coli* in washings at a practical laboratory.

The washings were taken according to the commonly employed method with sterile cotton wads on glass rods inserted into test tubes containing sterile physiological solution. Not more than 2-3 hours passed between acquisition of the washings from the objects and their inoculation in the laboratory. On being delivered to the laboratory the test tubes and their wads were carefully shaken, the wads were squeezed out, and an equal quantity of the washing liquid was inoculated by sterile pipettes into test tubes containing 5 ml Kessler and KODA medium.

The inoculations in Kessler medium were incubated at 43°C, while those in KODA medium were incubated at 37°C for 18-24 hours, after which subinoculations were made from both media into Endo medium irrespective of visible signs of growth. Smears were prepared from Endo medium containing suspicious colonies, and then stained with Gram's stain and viewed under a microscope. Subinoculation into a medium containing glucose and (Andrede) indicator from colonies in which Gram-positive bacilli were detected was performed; results were read after storing the medium at 43°C for 18-24 hours. *E. coli* was said to be present when acid and gas were present in the glucose medium.

Growth of *E. coli* in KODA medium was accompanied as a rule by pronounced change in nutrient color: It turned from blue-violet to green, with diffuse clouding occurring and gas forming in the form of foam in the upper part of the test tube. Such changes were noted after 14-16 hours in 91.8 percent of the cases, occurring after 20-24 hours in all others.

The results of parallel analyses of 1,181 washings are presented in the table below. Negative results in both media coincided in 966 (81.7 percent) cases, while positive results coincided in 123 (10.5 percent); the total number of coinciding negative and positive results was 1,089 (92.2 percent), which indicates that the nutrient media being compared are identical. In our parallel analysis of 1,181 washings we isolated 133 *E. coli* cultures from Kessler medium and 205 from KODA medium--that is, the latter produced 72 more (1.5 times more) than did the Kessler medium.

---

\*Preparation of KODA medium: Carefully mix 4.3 gm dry nutrient medium in 100 ml distilled water, heat over low flame, and boil for 2-3 minutes. Pour 5 ml into sterile test tubes, and the medium is ready for inoculation.

Results of Comparative Analysis of Washings for Presence of *E. coli*

(1) Питательная среда		(2) Количество исследований	
Кесслера (3)	(4) КОДА	абс. (5)	%
—	—	966	81,7
+	+	123	10,5
—	+	82	7,0
+	—	10	0,8
(6) Всего...		1181	100,0

Note: Plus--positive results; minus--negative results.

Key:

- |                       |             |
|-----------------------|-------------|
| 1. Nutrient medium    | 4. KODA     |
| 2. Number of analyses | 5. Absolute |
| 3. Kessler            | 6. Total    |

Thus comparison of Kessler and KODA media on the basis of identical criteria shows that the latter has a greater capacity for growing *E. coli*. This can be explained apparently by its elective and inhibitory properties simultaneously. The inhibitory properties of KODA medium are confirmed by the fact that in the analysis of 1,181 washings, cocci were isolated from Kessler medium in 65 (5.6 percent) cases, while cocci were isolated from KODA medium in 13 (0.9 percent) cases, or five times less frequently than from Kessler medium.

#### Conclusion

KODA medium has a number of advantages over Kessler medium: The need for additional expenditures of nutrient medium (Endo, broth and glucose) and laboratory vessels to make, stain, and subject these preparations to microscopic analysis is eliminated; the labor productivity of laboratory workers rises; the results of washing analysis are acquired in 1 day; KODA medium has pronounced inhibitory properties in relation to incidental cocci; the capability KODA medium has for growing *E. coli* is 1.5 times greater.

In addition KODA medium is simple to make, pH need not be determined, and it does not require sterilization. The last three qualities and the pronounced inhibitory properties in relation to saprophytic cocci provide it great advantages over other nutrient media (3-5) used presently for quick detection of *E. coli* in smears.

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A SIMPLE METHOD FOR GROWING ASPOROUS ANAEROBIC MICROORGANISMS ON FLAT MEDIA

Moscow LABORATORNOYE DELO in Russian No 9, 1977 pp 557-558

[Article by L. A. Somova, N. I. Blinova, and O. V. Chakhava, Institute of Epidemiology and Microbiology imeni N. F. Gamaley, USSR Academy of Medical Sciences, Moscow]

[Text] Significant successes have been attained in anaerobic cultivation techniques, but most of the existing methods are rather laborious (1-3). The method for cultivating asporous anaerobes proposed by Haenel (3) has enjoyed the most widespread use in recent years; this is a watch glass method, which was described in domestic literature by N. N. Liz'ko et al. (4). In this method the seeding material scattered as droplets on hard media is covered by overturned watch glasses bearing agar on which the aerobe *Serratia marcescens* is initially grown. Though it is not technically difficult, this method requires a great deal of time in preparing *Serratia marcescens*: An 18-hour culture is needed, a washing of which is seeded as droplets on watch glasses on the following day and cultivated for 4 hours; only after this can the anaerobes be inoculated.

We attempted to grow anaerobes in a carbon dioxide atmosphere, placing dishes holding the inoculated material in polyethylene bags. This method was found to be suitable for cultivation of asporous anaerobes: Lactobacilli and *Bifidobacterium* grew on differential media on the second day. This method is rather simple and practicable. After the dishes containing the inoculants are placed in their bags a rubber tube to introduce carbon dioxide from a tank is lowered into the bags as far as possible (so that it almost touches the floor), and the cock is opened. The initial volume of gas entering the bag and the remaining air were released by compressing the bag. Then the bag was once again filled with carbon dioxide, and finally the polyethylene package was twisted tightly and secured with a rubber clamp. After we made sure that gas was not leaking from the bag we placed it and the cultures it contained into a thermostat at 37°C.

We compared Haenel's watch glass method with the method we suggested for creating anaerobic conditions using "soldered" polyethylene bags.

In both cases suspensions of rat fecal matter were ground with glass rods in test tubes, to which phosphate buffer was added, as suggested by Haenel and Muler-Beuthow (5), until a basic dilution of 1:100 was attained. Then 0.05 ml of the appropriately diluted fecal suspension was inoculated by placing droplets on hard medium.

#### Comparison of Methods for Anaerobic Cultivation of Microorganisms

Анаэробы (1)	Селективная среда (2)	(3) Метод	
		часовых стекол (4)	«запаянных» полиэтиленовых мешочков с CO <sub>2</sub> (5)
(6) Лактобациллы	(8) MPC-4	7,7±0,3	7,7±0,35
		8,5±0,5	8,8±0,6
		7,6±0,4	7,7±0,7
(7) Бифидобактерия	(9) № 5 (по Haenel)	8,0±0,3	8,0±0,4
		8,4±0,2	8,2±0,2

Key:

- |                                                     |                           |
|-----------------------------------------------------|---------------------------|
| 1. Anaerobes                                        | 6. Lactobacilli           |
| 2. Selective medium                                 | 7. <i>Bifidobacterium</i> |
| 3. Method                                           | 8. MRS-4                  |
| 4. Watch glasses                                    | 9. No 5 (as per Haenel)   |
| 5. "Soldered" polyethylene bags and CO <sub>2</sub> |                           |

The table above shows the results acquired in our comparison of the described methods. We used selective media to cultivate anaerobes in both cases: The quantity of lactobacilli was determined with modified MRS-4 medium developed by the Department of Microbiology of the Tartu University (6), while the quantity of *Bifidobacterium* was determined with medium No 5 proposed by Haenel (3). The quantity of microorganisms per gram of fecal matter was expressed in absolute logarithms. The confidence interval of the logarithm of the average was geometrically computed for a probability of 95 percent (7).

We can see from the table that when the methods described above are used the indices attained for lactobacilli and *Bifidobacterium* do not differ significantly (practically identical results were obtained in both cases).

The method of "soldered" polyethylene bags we proposed was, in our opinion, more economical in terms of time, since there is no need to use watch glasses bearing agar to cultivate *Serratia marcescens*, which requires an additional 22 hours before cultivation of anaerobes can begin.

Thus the method we proposed for creating oxygenless conditions permitting cultivation of asporous anaerobic microorganisms can be fully acceptable for the goals indicated above since, while it is not inferior in quality to the existing methods, it is significantly superior to them in relation to its simplicity and practicability.

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## MICROBIOLOGY

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### DRY YEAST HYDROLYSATE MEDIA TO GROW CHOLERA VIBRIO

Moscow LABORATORNOYE DELO in Russian No 9, 1977 pp 552-555

[Article by Z. I. Vasil'yeva, N. Z. Trofimenko, L. S. Lipayeva, and A. D. Safonova, Irkutsk Scientific Research Antiplague Institute of Siberia and the Far East]

[Text] Research in recent years (1) has shown that yeast nutrient media could be used to cultivate cholera vibrio.

We studied the possibility of using yeast hydrolysates as a nutrient source from which to make dry media, and the possibility for growing cholera vibrio in these media. We used nutrient protein yeasts from the Tulun Hydrolytic Plant (MRTU 59-2-61) and baker's yeast (MRTU 169-71). Yeast hydrolysates to make the dry media were obtained according to (Khottinger's) method. In our preliminary experiments we made different variants of the hydrolysates having different ratios of yeast and pancreas. In all, we obtained 10 variants.

To make dry yeast media we used hydrolysates for which the ratio of proteins to pancreas to water was 1:1.5:10 (420-460 mg-percent amine nitrogen). We obtained dry yeast hydrolysate media according to a method developed by colleagues of our institute to produce dry media for diagnosis of cholera vibrio (2). In all, three series of experiments were performed.

In series I we studied the effect of different concentrations of amine nitrogen on growth properties of yeast media. For this purpose we made and used media with amine nitrogen concentrations of 28, 56, and 98 mg-percent.

In series II, we tested the effect of sodium metabisulfite (sodium pyrosulfate-- $\text{Na}_2\text{S}_2\text{O}_5$ ) on growth properties of the media under analysis, for which purpose we added 0.1 percent sodium metabisulfite to the dry media as they were made.

In series III, we determined accumulation of biomass--the yield of El Tor classical cholera vibrio in yeast media with and without sodium metabisulfite.

We used casein agar and Marten's agar as controls.

We tested the growth qualities of the media by inoculating a suspension of 18-hour agar culture of standard strain No 145 of classical cholera vibrio and vaccine strain No 3116 of El Tor vibrio at doses of 10, 50, and 100 microbial cells. Each dose was inoculated on three agar plates bearing the yeast media under analysis and a control medium. To determine yield we prepared a 1:1 billion vibrio suspension from an 18-hour agar culture grown in Marten's broth and then inoculated it at a dose of 10 ml on the sloping surface of yeast and control media having an area of 50 cm<sup>2</sup>. The inoculations were incubated at 37°, and the results were determined after 10, 12, 18, and 36 hours. Accumulation of microbial mass on the sloped media was determined after 18 hours. The results of the 10 experiments were subjected to statistical treatment according to the method suggested by Montsevichyute-Eringene (3).

Dry yeast media containing 56-98 mg-percent amine nitrogen are not inferior to Marten's peptone medium with respect to growth properties. As is the case with Marten's agar, initial growth of cholera vibrio inoculated into yeast media at doses of 10 and 100 microbial cells begins after 10-12 hours in the form of round vitreous colonies with a diameter from 0.2 to 0.8 mm; by 18-20 hours the colonies began to be well distinguishable, they reached a diameter of 1.2-1.5 mm, and their edges were even and distinctly outlined. The quantity of mature colonies reached 32-44 percent.

Growth of cholera vibrio was noted to be somewhat slower in yeast media having a low amine nitrogen content (28 mg-percent). Appearance of colonies was observed not earlier than after 18 hours in this case, especially with the 10 microbial cell inoculation dose; colony formation stretched on until the 36th hour; we observed that the colonies were polymorphic in size and that they were streaked and much grainier than colonies in the control medium and in yeast media with a higher concentration of amine nitrogen.

As can be seen from the table, sodium metabisulfite improves the growth qualities of the media. The number of cholera vibrio cells was significantly higher in media made from baker's yeast and containing sodium metabisulfite than in media without sodium metabisulfite. The difference is statistically significant ( $P < 0.05$ ). An especially distinct influence of sodium metabisulfite on growth of cholera vibrio can be observed when classical cholera vibrio strain No 145 and vaccine El Tor vibrio strain No 3116 are grown in media made from nutrient yeast hydrolysates. In this case 32-35 percent of the microbial cells grow, while growth of vibrio is absent in media without metabisulfite. In addition we also established that sodium metabisulfite heightens the yield of cholera vibrio when it is added to yeast media.

Thus the results of these series of experiments show that sodium metabisulfite not only stimulates growth of classical cholera vibrio and El Tor vibrio from single cells but also heightens the yield of microbial mass when large doses of the microbes are inoculated, which is especially important to production of cholera vaccines.

Growth of Cholera Vibrio in Different Dry Media (Averages of 15 Determinations); M<sub>1</sub>m.

	(1) Гидролизат агаровой среды	(2) Содержание аминного азота, мг%	(3) Выросло при посеве на чашку Петри особей					
			10		50		100	
			№ 145	№ 3116	№ 145	№ 3116	№ 145	№ 3116
(4) Пекарские дрожжи + 0,1% метабисульфит натрия		50	1,5±0,5	2,5±0,6	16,0±3,7	25,0±3,1	23,4±4,0	37,0±3,1
(5) Пекарские дрожжи без метабисульфита натрия		100	2,4±0,5	4,0±0,6	20,0±2,8	23,0±3,2	32,0±3,5	32,0±3,5
(6) Кормовые дрожжи + 0,1% метабисульфит натрия		50	0,5±0,2	1,0±0,2	10,0±4,1	14,0±3,7	22,0±3,5	19,0±3,6
(7) Кормовые дрожжи без метабисульфита натрия		100	0,6±0,5	2,7±0,4	12,0±3,9	19,0±3,3	23,0±3,1	27,0±2,4
(8) Казеин		50	2,5±2,5	2,5±0,5	24,0±3,6	29,0±3,9	36,0±2,6	36,0±3,9
(9) Агар Мартена		100	2,0±0,6	3,3±0,5	27,5±3,9	26,0±3,0	35,0±5,0	32,0±3,5
		50	0	0	0	0	0	0
		100	0	0	0	0	0	0
		50	1,2±0,7	2,0±0,5	17,0±3,3	20,0±2,9	30,0±4,4	30,0±3,5
		100	1,2±0,4	2,0±0,5	18,0±2,9	22,0±3,0	31,0±3,2	30,0±3,3
		50	1,0±0,4	2,6±0,3	20,0±3,8	23,0±2,9	30,0±4,1	30,0±3,3

Key:

1. Agar medium hydrolysate
2. Concentration of amine nitrogen, mg-percent
3. Number of specimens grown after inoculation in a Petri dish
4. Baker's yeast + 0.1 percent sodium metabisulfite
5. Baker's yeast without sodium metabisulfite
6. Nutrient yeast + 0.1 percent sodium metabisulfite
7. Nutrient yeast without sodium metabisulfite
8. Casein
9. Marten's agar

We established that the cultural and morphological properties, agglutinability, phagolysability, and the capabilities for oxidation and enzymatic lysis of carbohydrates are identical for cholera vibrio grown in yeast and casein media.

#### Conclusions

1. Dry yeast media (made from baker's and nutrient yeast) are suggested for diagnosis and cultivation of cholera vibrio; as compared to casein media, these media are more sensitive, and they are about five times cheaper.
2. Dry media made from baker's and nutrient yeast hydrolysates to which 0.1 percent sodium metabisulfite is added can support growth of cholera vibrio from single cells and produce a considerable yield of microbial mass when the microbial inoculation doses are large.
3. The high yield and good quality of the microbial mass of cholera vibrio obtained with the dry yeast media we developed permit us to recommend these media for testing in the production of cholera vaccines.

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PSYCHOLOGY

CRITIQUE OF THEORIES ON PERSONALITY TYPES

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{Article by Prof K. Platonov, Doctor of Psychology, in the column "The Institute of Man": "The Harmony of Differences"}

{Text} In many western countries, arguments about the degree of people's similarities and differences have become especially acute of late. Are all people the same in their basic psychological make-up? Or is each person unique and not at all like others? Or perhaps there are several personality types which combine "identical" types of people into groups which are decidedly different from each other? The sharpness of such discussions is understandable. After all, not only the development of science but also the degree of its influence in social practice depend to a great extent on the answers to these questions.

Today we will acquaint the reader with an article by a group of American psychologists in which the unwarranted tendency to derive several unfounded social conclusions from a specific scientific study is distinctly evident. The well-known Soviet scientist, Professor K. Platonov, Doctor of Psychology, disputes their point of view.

The article by the group of American scientists touches upon one of the most complex and urgent problems of social psychology: the personality problem. However, to what extent is their position valid? To what extent is their claim to a "new word" in social psychology justified?

Time, as well as space, is the basic form of matter's existence. Time naturally exerts a considerable influence on living organisms which possess specialized organs for perceiving it. However, the process of time perception in man is a little-studied area at present. Therefore, one must treat with caution attempts at a scientific answer to the question: what meaning does man's consciousness of his present, past and future have in his psychological life. This would not only help us to better understand significant aspects of psychological development, but we could also use it for young people's occupational selection and orientation and to develop new methods for treating several mental illnesses and disorders.

The American psychologists maintain that they have established the fact that people perceive the present, past and future differently. They maintain that the differences in time perception are related to specific traits in the psychological habits and behavior of these people. Finally, they conclude that all people can be divided into a small number of types based on this principle. Of course, one should consider such results as interesting and worthwhile. But, under one condition: if they are methodologically well-founded and true.

In general, is it permissible to divide people into types? What is meant by the concept "human type"? What are we talking about: biological, psychological or sociological types?

It must be said that there is no end to the attempts to classify people according to all these categories.

For a long time there have been attempts to place man as a biological organism into the smallest number of clearly defined types which have acquired the name "constitutions." Thus, the German doctor T. Brughsh divided people into narrow, normal and broad

statures. The French doctor K. Sigo isolated four constitutions: "respiratory," "digestive," "muscular" and "cerebral." The Soviet doctor M. V. Chernorutskiy isolated three constitutions: asthenic with predominant body dimensions in height and not width, hypersthenic which is the opposite and normosthenic, without any one-sided predominance.

Such classifications are entirely possible. However, it is clear to everyone that what is important is not that a man is a blonde, brunette or bald, thin or heavy, but that he is, as the psychologists like to say, a unique person. Marx and Engles wrote: "...The essence of a 'particular personality' is not made up of its beard, blood and abstract physical nature, but of its sociological quality." However, if personality is unique, is it possible to formulate personality "types"?

The authors of the article mention the Greek Theophrastus who wrote the tract "Ethical Characters" long before our time. He divided the character types he described according to their most pronounced features: "flattery," "garrulousness," "boring conversationalist," "bragging," "pretence," etc. He expressed the idea that people's character types reflect the moral life of society.

But, is it possible to place "all people" into a "limited number of types" as the authors of the article being discussed write in its first sentence? Of course not. And it is not by accident that they do not mention that a follower of Theophrastus, the French writer and moralist Jean La Bruyere, published a book in 1688, in which, from the same perspective, he described 1,120 character types. Among them are such accurate and brave--for his time--character types as the "bigot"--one who would become an atheist if the king was an atheist. But, of course, the number 1,120 does not use up all the possible character types. After all, the entire history of literature is a system of attempts to describe contemporary types. But, it is doubtful whether anybody will now try to compile a "register of types" from the Odyssey and Priam, Lear and Hamlet, Mitrofanushka and Pechorin up to Ostap Bender and Doctor Mishkin.

Beginning in the 17th century, scientists have also attempted to relate people's biological types to their "personality types."

The German psychiatrist's, Ernst Kretschmer, book "Body Structure and Character" had the greatest repercussion in all countries; for the book's epigraph, he took the words Shakespeare put into Caesar's mouth about Cassius: "Would he were fatter..." These words imply that if Cassius were fatter he would not be so secretive and treacherous. Kretschmer tried hard to relate physical constitution to character.

Specifically, he relied on two extreme constitutional types which found their expression in classic builds and character types--Don Quixote and Sancho Panza. Who, in fact, can conceive of Don Quixote's personality in the build of a Sancho Panza? However, these characteristics were elevated to a law by Kretschmer, a law which supposedly even defined the fatalistic condition of man's social essence. He believed that the type of psychological illness a particular person suffered from was also dependent on this.

The Italian psychiatrist and criminologist, Cesare Lombroso, attempted to relate body structure to criminal nature. He steadfastly proposed not only that -- for the sake of preventing crimes -- people with "criminal signs" be sent to uninhabited islands, but also that they be physically destroyed. Lombrosism was adopted as a weapon of racism and fascism. Science has completely and decisively refuted this reactionary theory. However, it still plays a negative part to this day, although in a somewhat paradoxical manner. Fearing the rebuke of "Lombrosism" as the biologicalization of the personality, many jurists and psychologists have fallen into the opposite mistake--vulgar socialization--and they have slowed down the study of many important problems in general. It is appropriate to cite the words of academician B. M. Kedrov here: "...When evaluating the two polar opposites--the social and biological--one cannot say that, when a person takes a Marxist stand, he is obligated to stress the social factor. One can stress the social factor and not take a Marxist stand and, on the contrary, one can stress natural factors and take a Marxist stand."

Although a strong relationship between man's constitution and his personality type was refuted by science, the relationship between temperament and nervous system types, which was developed by I. P. Pavlov, is unassailable.

Each person is unique. But, this uniqueness arises as a result of the fact that each of us possesses a special combination of biological, psychological and sociological components which can be synthesized into different personality types according to diverse criteria. Such a concept of personality types is based on V. I. Lenin's teaching on the universal, the particular and the isolated, which are properties of everything in the world.

Summarizing what has been said: the answer to the question--in principle, can people and their personalities be divided into types--must be positive. Philosophers and scientists have been trying to do this with differing degrees of success for 3,000 years. However, the answer--"it is possible"--requires an obligatory continuation: "but it depends on how and why."

In light of the unquestionable importance of the scientific study of personality types, it is necessary to remember that a clear-cut evaluation of the criteria used to combine people into a type is obligatory. Only then can one judge, in general, whether it was necessary to isolate these types.

Why, as a matter of fact, did the authors of the article relate the unsuccessful personality classification of the well-known Freudian psychologist K. Jung to time perception, which is based on the still very little studied area of the body's biological rhythms. Why do they relate time perception to independent, isolated psychological functions: perception, the emotions, thinking and intuition? Why not to some of man's other qualities? After all, there can be any number of arbitrary criteria. For example, the well-known writer Yuriy Olesha liked to say that he divided all people into two types: those who studied in the same Odessa gymnasium he studied at and those who didn't study there. This is in a jocular vein, but it is also a criterion of a typology which is only needed by its author. There is a saying in England: it is dangerous to marry a woman who doesn't laugh

at what you think is funny! And this is also a criterion! The well-known polar explorer, V. Yu. Vize, divided people into three types according to this criterion: a group one cannot go to a polar station with because of their health; a group one cannot go with because of their personal qualities; and a group that one can go with.

It must not be forgotten that the attempt to divide people into different "human" types is not a completely harmless occupation. After all, it is as though it is in the name of "highly respected science," when a specific, live, real person's "personality is diagnosed." They tell him: you belong to this specific type and therefore you are capable of these specific behavior patterns and not capable of these others. What lies in store for a person if he is "tested" on the basis of a typology which is founded on accidental, unfounded, unscientific criteria! Unfortunately, this practice has become a mass phenomenon and is gathering increasing momentum. It has reached such an extent that a number of magazines here and abroad publish pseudoscientific, but attractive, offers: "Determine your personality type by the recommended method!" And if a person believes the "diagnosis"?

The problem of typification is so acute in world science today because sociological conclusions--frequently highly reactionary--are made on the basis of different types of psychological studies. For example, just recently, based on typological studies of "white" and "colored" Americans, several psychologists in the USA argued that the former have an advantage over the latter in a number of psychological qualities. However, they did not consider such important factors as level of education, standard of living and personality development in the two groups. The apparent differences were related to these sociological factors. But, somebody rushed to the conclusion of the "racial inferiority of colored people." It follows from this that the most "innocent" psychological studies can pose great social and political danger if they are not based on methods which are vigorously and scientifically validated.

Is it possible to maintain that a typology based on four ways of perceiving time is a research method which is built on irreproachable scientific facts? Unfortunately, the authors did not prove this. This is why it is not possible to treat their typology with the measure of seriousness they claim for it.

And the main point: it is impossible to draw such socially tinted and hopeful conclusions--which forced me to take up the pen--from the American psychologists' studies.

The main conclusion of the article is related to the fact that supposedly "conflicts occur because the same event is perceived differently by different people." In the authors' opinion, it follows from this that "mankind cannot solve its most urgent social and political problems, and also difficulties in interpersonal relations, without considering the differences among people." And, finally, the article concludes with an evaluation of the great importance of this conclusion: "We believe we have taken the first step."

But, is it possible to truly evaluate such conclusions as a significant step forward in understanding man's nature and his social being. After all, everything in them that is correct has been known for a long time and that which is incorrect has been known even longer.

In fact, a long time ago science exposed the "common sense" error that all people supposedly possess the same perceptual ability. In the middle of the last century, the eminent psychologist Fechner proved experimentally that individual differences in thresholds for the different senses are significant. Contemporary psychology possesses a great wealth of data relating to the individual differences in man's psychological characteristics. However, does this mean that a given fact serves as the basis, and almost the only cause, for conflicts--personal, social and political? It is hardly necessary to waste a lot of words exposing this old and banal error. Marxist science proved long ago that the laws of society are not based mainly on the psychological traits of different people--individual or typological traits--but on their social being which

is the basic factor that molds man's personality. Therefore, it is not a change in the psychology of the individual which causes social and political transformations, but, on the contrary, it is changes in social living conditions which determine the direction for change in man's psychology and behavior.

The authors of the article in PSYCHOLOGY TODAY are planning to eliminate all social conflicts by reorganizing people's consciousness through psychological methods alone. But, can this be done? And, most important, is it necessary to do this?

I remember an extremely instructive case which took place at the end of the fifties, when the well-known Soviet psychologist B. Teplov began to study Pavlov's typological characteristics of the nervous system with his students. A special case immediately cropped up. One of the tenth grade students, as well as several of his classmates, was shown to have a weak type of nervous system. And, when school ended, he--as if by error--received a gold medal. Then several pedagogical professionals decided something was wrong here: either the psychologists or the teachers had made a mistake. A gold medalist cannot be a weak type! Take away the medal! A strict test of his knowledge and nervous system type was organized. It turned out that everything was correct. And there is nothing surprising in this. One cannot make a hard and fast relationship between a person's membership in a particular type and his social success. B. Teplov exposed the myth of the social inferiority of people with a weak type of nervous system. It is true that they are not suited for work as aviators or steeplejacks. But, on the other hand, both Gogol and Chaykovskiy belonged to this type. This case confirmed that the social value of a person is not determined by his type but by the correspondence between his personality type and his work conditions.

But, perhaps, the authors of the article being discussed are right in saying that when people belong to different psychological types, it interferes with their social intercourse and mutual understanding? This question has great practical significance from the point of view of the psychological compatibility of members of a collective.



The study of socio-psychological compatibility--which is swiftly developing under the pressure of its application--shows the decisive importance of social factors. Perhaps the most convincing evidence for this are the four blind-deaf students who are successfully attending Moscow University. The example of the closest contact and mutual understanding between these four students--who are deprived of their sight and hearing--and their teachers is an especially vivid refutation of a unidimensional, superficial understanding of the relationship between personality type and interpersonal relations.

Scientific data attest to the fact that contact and mutual understanding between people of different psychological types frequently is more productive than between people of the same type. This is well known by sports psychologists and trainers: they never make up sports teams with sportsmen of one personality type. Leaders who staff polar station teams and astronaut crews also know this. It is also well known that during group psychotherapy, the effect will also be lower in a group composed of similar personalities than in a group specially selected from different types. A vast number of similar examples can be cited.

Thus, the first step, which the American psychologists consider a step toward truth, is more like running in place.

I think that the present publication must be examined in much more detail than can be accomplished by just considering the new typology proposed by the authors. The personality problem, the problems of what is individual, universal and typical in psychology, the problems of the social and psychological compatibility of people--these are extremely important, crucial and not fully studied problems. Their correct or incorrect solution can bring a great deal of benefit or harm to society. This is why Soviet psychologists must not brush such tasks aside, but must study them with a great deal of activity and energy.

Society needs reliable knowledge about man, about human types and about the laws of interpersonal relations.

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THE ROLE OF THE BIMANUAL EFFECT IN DETECTION OF A USEFUL SIGNAL AGAINST THE BACKGROUND OF INTERFERENCE

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian No 7, 1977 pp 54-59

[Article by D. S. Matoyan and A. I. Oganessian, Armenian Pedagogical Institute imeni Kh. Abovyan, Laboratory of Psychological Problems, submitted 11 Oct 76]

[Text] This article submits the results of a study of patterns of residual masking in the cutaneous analyzer of man with bimanual presentation of a useful signal and interference, as well as a comparative analysis of patterns obtained with single-point and bimanual presentation of pairs of stimuli.

It was found that with both types of presentation of stimuli the patterns of residual masking in the dermal analyzer are similar; however, the effect of bimanual masking is considerably milder than that of a single-point presentation of stimuli.

In this work we describe the patterns of residual masking in the human cutaneous sensory system with separate presentation of two mechanical stimuli.

Residual masking, i.e., the masking effect of a strong sensory stimulus (masking stimulus) on the next mild (test stimulus) stimulus in the human cutaneous system, has been investigated comprehensively by these authors [1] in the case of single-point delivery of both stimuli. However, with single-point delivery of stimuli it is difficult to determine the share of involvement of central and peripheral elements of the analyzer in forming a complex sensory reaction against the background of residual masking.

To answer this question, we conducted a series of experiments involving separate delivery of stimuli to two symmetrical regions of the human skin. The method of separate delivery of stimuli to receptor fields with separate innervation (binaural, binocular) permits demonstration of the central level of interaction between the effects of the stimuli and thus gain deeper understanding of the nature of masking and its patterns [2-5].

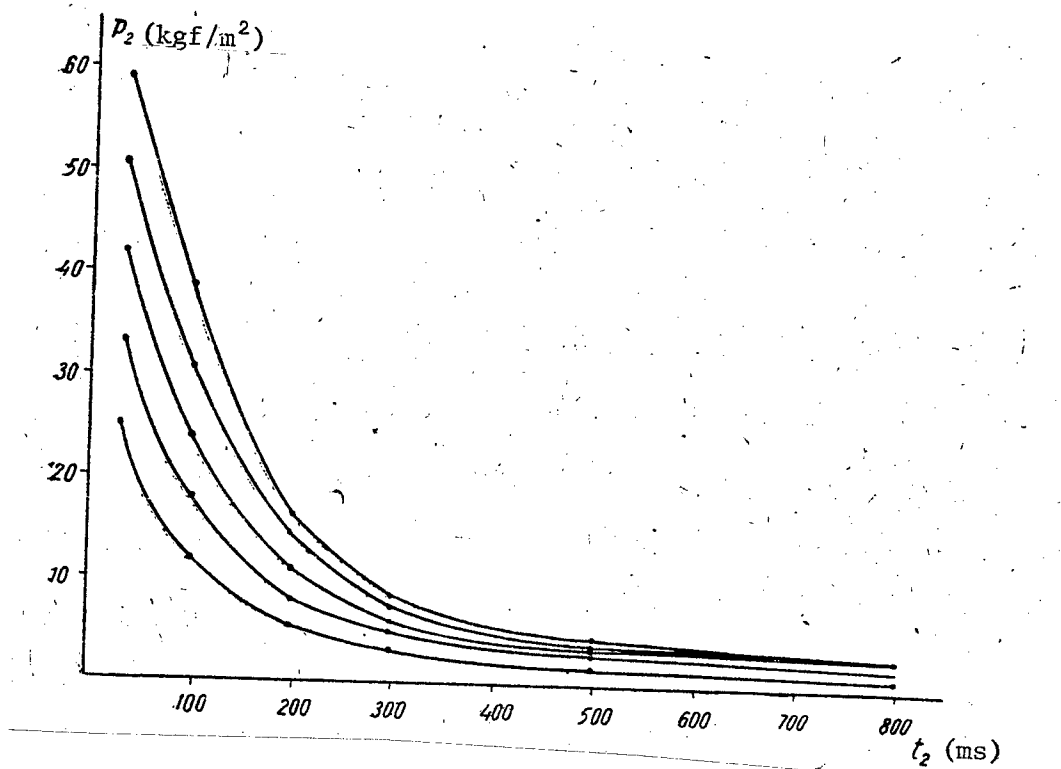


Figure 1. Pressure and duration (P-t) of bimanual residual masking. Curve 1--pressure--time obtained with the system at rest. X-axis, duration of test stimulus  $t_2$ , ms; y-axis, pressure of test stimulus.

For the sake of brevity and convenience of presentation, by analogy with the terms "binaural masking" and "binocular masking" to describe masking in the case of separate delivery of two cutaneous stimuli, we introduced the term "bimanual masking" ("bimanual taction," taction with both hands [6]), which we shall use in this work. "Bimanual masking" of a signal refers to the process through which detection of one signal is made difficult in the presence of another signal, i.e., interference, delivered to a symmetrical section of the human skin.

#### Material and Methods

In this study, two tactile stimuli were delivered to the skin of the dorsal aspect of the hands of three subjects, A. O., F. Zh. and A. P., 23 years of age. A verbal answer served as the reaction to stimulation. We used pairs of air pulses delivered at variable intervals as the stimuli; they were separately regulated with regard to duration, pressure, stimulated area and delivery site.

We have supplied a comprehensive description of the instrument and experimental methods in one of our works [1] dealing with investigation of the phenomenon of residual masking in the case of single-point delivery of both stimuli.

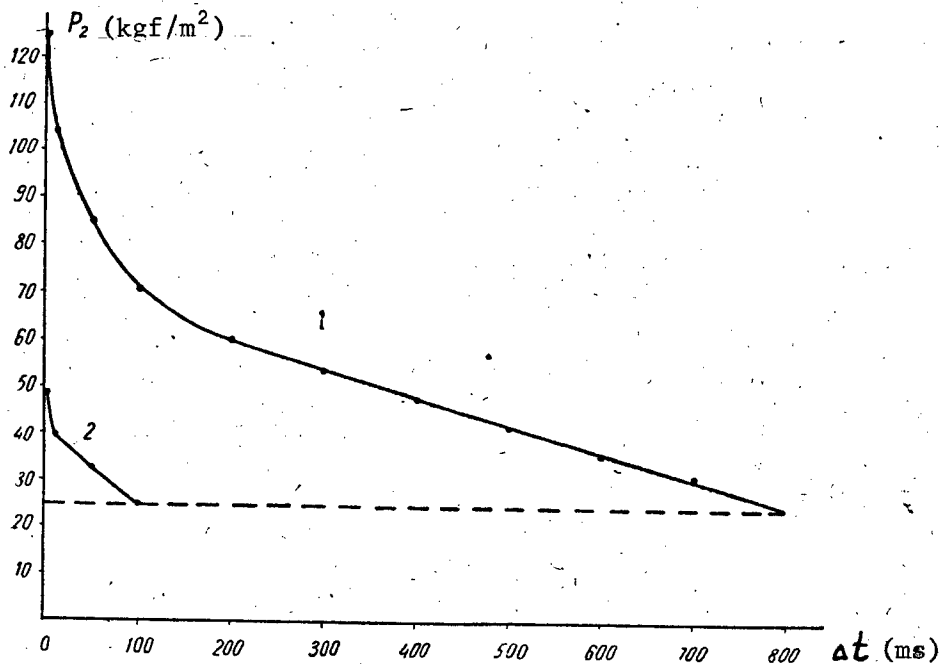


Figure 2. Pressure of test stimulus--interval. Dotted line, threshold pressure of test stimulus with  $t_2 = 30$  ms; x-axis, time between stimuli, ms; y-axis, threshold pressure of test stimulus

The curves submitted here were plotted from the mean data of 10 experiments. Figure 1 illustrates pressure--time (P-t) curves characterizing excitability of the cutaneous system against the background of residual masking in the case of bimanual delivery of stimuli (curves 2, 3, 4 and 5) at a masking stimulus pressure of 200 thresholds and intervals of 100, 50, 10 and 1 ms. (We first determined the absolute threshold for all of the subjects and established the masking level in relation to it: at 30, 100, 150 and 200 thresholds).

#### Results and Discussion

As can be seen in Figure 1, the shorter the second test stimulus, the stronger the effect of masking of the second stimulus by the first, masking one. This figure also shows that the shorter the masking interval, the greater its effect (curve 5). Figure 2 illustrates the curves of masking thresholds as function of the intervals between stimuli. Figure 2 shows that, in the case of bimanual delivery of stimuli (curve 2), the masking interval, i.e., the minimal interval between stimuli with which the first stimulus no longer has a masking effect on the threshold of the second one, constitutes 100 ms, whereas in the case of single-point delivery of stimuli it constitutes 800 ms (curve 1) (standard deviation does not exceed 3% of the mean of all curves). Figure 2 graphically illustrates the substantial differences in masking

thresholds, along with the similarity of masking curves with different modes of presentation of stimuli. A comparison of the masking threshold as function of masking stimulus pressure (Figure 3) and duration (Figure 4) leads us to the same conclusion. Figure 3 shows that with both single-point (curve 1) and bimanual delivery (curve 2) of stimuli the masking thresholds demonstrate a linear function with masking stimulus pressure; however, the masking effect is significantly milder in the case of bimanual delivery.

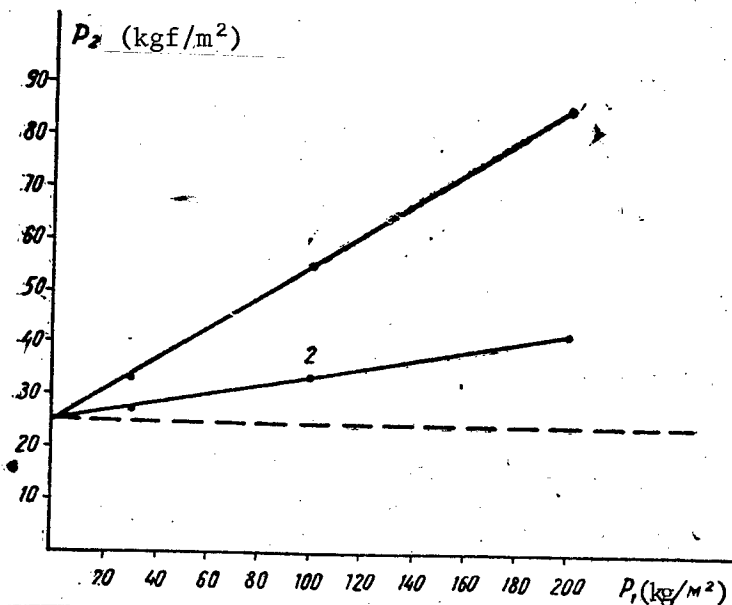


Figure 3. Magnitude of test stimulus as function of masking stimulus. Dotted line, threshold pressure of test stimulus, with  $t_2 = 30$  ms; x-axis, masking stimulus pressure, kgf/m<sup>2</sup>; y-axis, threshold pressure of test stimulus, kgf/m<sup>2</sup>

The studies revealed that the masking threshold is a function not only of pressure of the masking stimulus, but its duration, i.e., the masking effect of the stronger of the pair of stimuli is determined by the energy of this stimulus in the range of intervals between stimuli of 1 to 500 ms for single-point delivery and 1 to 100-200 ms for bimanual presentation. This function is illustrated in Figure 4, which also shows attenuation of the masking effect with bimanual delivery of stimuli (curve 2). (The level of reliability for the curves in Figure 4 constitutes 0.001 according to Student). It is easy to see that, with both bimanual and single-point delivery of stimuli, there is an increase in threshold of residual masking with increase in duration of the masking stimulus. This relationship between threshold of residual masking and energy of the masking stimulus is attributable to the stability of excitation induced by this stimulus, which lasts after it is discontinued. The attenuation of the effect of residual masking with change in method of

delivering the stimuli (change from single-point to bimanual delivery), which was demonstrated not only by us, but by investigators dealing with hearing and vision [2-5], is apparently due to alleviation of processing of nervous information passing into the centers via different channels and perceived by different elements of the cortical projection of the analyzer.

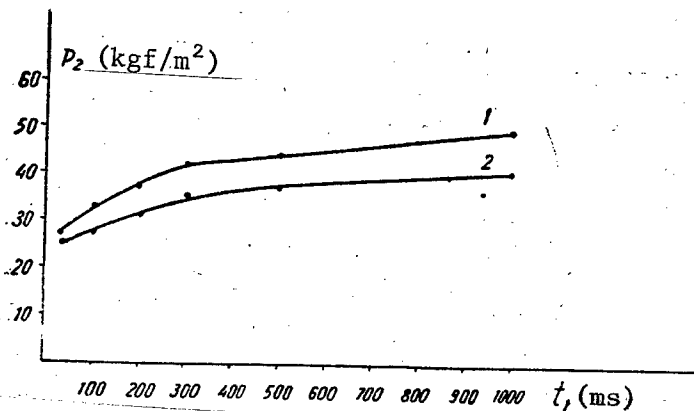


Figure 4. Thresholds of residual masking as function of duration of masking stimulus. The interval between stimuli is 50 ms. X-axis, duration of masking stimulus, ms; y-axis, threshold pressure of test stimulus, kgf/m<sup>2</sup>

All models of useful signal processing in the case of dual delivery of signal and interference imply that the signals reaching symmetrical receptor fields with separate innervation are recoded; this is followed by centralized processing of differences between stimuli; the result is integrated and proceeds to the discriminator which puts out the response concerning presence or absence of a useful signal against the background of interference [7].

Thus, the role of the bimanual effect in detection of a useful signal against the background of interference consists of lowering the masking thresholds, and this is apparently related to the paired function of both hemispheres of the human brain.

The similarity of our findings and data obtained with regard to the auditory and visual analyzers confirms, once more, the fact that there are common physiological mechanisms of binaural, binocular and bimanual residual masking in the different sensory systems of man.

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PUBLIC HEALTH

MULTIPLACE STATIONARY PRESSURE CHAMBER FOR HYPERBARIC OXYGENATION OF THE ORGANISM

Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 8 (377) 1977 pp 45-47

[Article by T. O. Orynbayev, M. I. Pobortsev, V. M. Trofimov, M. I. Shatinkina, A. A. Subbotin, K. N. Geronin, V. K. Mayer, M. K. Sazhenov, and S. F. Sobin, Chimkent Municipal Hospital No 6, Affiliate of the Leningrad Branch of the State Institute for the Planning of Plants of the Basic Chemical Industry, Phosphate Plant]

[Text] The purpose of this report is to describe the design of a pressure chamber developed by us for the treatment of hypoxic states. The drawings of the pressure chamber were prepared at the affiliate of Lengiprokhim [Leningrad Branch of the State Institute for the Planning of Plants of the Basic Chemical Industry] (now, Kazakh Scientific Research Institute Giprosfosfor [State Institute for the Planning of Phosphate Plants], Chimkent) by designers V. M. Trofimov and M. A. Shatinkina under the direction of Candidate of Engineering Sciences M. I. Pobortsev. The blueprints were examined by Gosgortekhnadzor [State Committee of the Council of Ministers for Supervision of Industrial Safety and for Mining Inspection]. The pressure chamber was built under the direction of a physician, T. O. Orynbayev, by mechanical engineers, A. A. Subbotin, K. N. Geronin, and V. K. Mayer, and heads of the control and measuring instruments and automation equipment and oxygen shops, M. K. Sazhenov and S. F. Sobin. A special building with an area of 180 m<sup>2</sup> was built by our design for the equipment, the patients, the express diagnostics laboratory, and subsidiary facilities. The construction was carried out on a voluntary service basis.

The chamber itself is a steel cylinder of 14 mm<sup>3</sup>, 7.22 m long, with a diameter of 1.6 m, wall thickness 8 mm, steel -- 3 GOST 380-60. An air collector V-10 intended for industrial operation under pressure of 8 kg/cm<sup>2</sup> was used. Its total weight is 2680 kg. The pressure chamber itself is divided into two sections for the sake of convenience during operation. Each section has an independent control system, making it possible to control the chambers simultaneously or in different combinations.

The large section of the chamber, whose volume is 7.5 m<sup>3</sup>, is intended for reanimation, minor operations, and group (4 people) reception of therapeutic

patients. The small section of the chamber, which is a lock for the personnel with a volume of  $6.5 \text{ m}^3$ , is connected with the large section by means of an airtight door  $80 \times 60 \text{ cm}$  (efficiency expert certificate No 321). The latter serves for the entry and exit of the personnel to the large section of the chamber. It is not decompressed. At the ends of both sections, there are hatches  $70 \text{ cm}$  in diameter opening inward. They serve for rolling in the stretchers with patients. The side surfaces have entrance doors  $80 \times 60 \text{ cm}$  in diameter. The presence of the lock in the pressure chamber increases the maneuverability in work, shortens the time of medical care and increases its volume. The pressure chamber has observation windows. Organic glass  $20 \text{ mm}$  thick and  $18 \text{ cm}$  in diameter was used for this purpose. The glass is installed in a hollow between flanges with rubber lining and is fastened by bolts. The lighting is external, through the observation windows, with an emergency supply source and automatic switching. The large section of the chamber has a removable gurney on rollers made of duralumin on a rigid support. The gurney can be easily moved out of the chamber.

The walls of the chamber have connecting sleeves. The large compartment has two of them, and the small one has one. Each of them has 20 pairs of shielded wires. They are necessary for radio-telephone communication and for recording the functional state of the organism. The design principle is as follows: the cylindrical metal sleeve  $50 \text{ mm}$  in diameter and  $80 \text{ mm}$  high has an opening equal to the diameter of the bunch of wires. It is welded to the wall of the pressure chamber. The chamber also has an opening with a diameter equal to the opening in the bottom of the sleeve. Wires between two rubber linings are passed through the opening of the sleeve and the walls of the pressure chamber. They are sealed with a locking nut. This design provides a reliable protection against the leakage of the gas mixture from the chamber at pressures of up to 3 gauge atmospheres.

Oxygen enters the pressure chamber from the oxygen ramp.

The oxygen apparatus are not affected by the pressure within the chamber. It lets oxygen in only at the inlet. When there is no respiration in the patient, apparatus-assisted respiration is administered through a separate direct supply unit. Within each chamber, there are oxygen apparatus KP-28 for individual use (in the large compartment -- 4, in the small compartment -- 2). They are connected with the patient through corrugated hoses and masks. A pressure of 3 gauge atmospheres is created in the chamber by two compressors (GSV1/12) which goes through four filters: No 1 -- water and oil settling tank, No 2 -- compressed-air settling tank, No 3 -- ceramic rings and felt, No 4 -- activated charcoal with silica gel. The entry point of air with a nonreturn valve is located in the ceiling and terminates with a noise suppressor of a special design. The air exits through a flow gauge installed in the bottom of the chamber. This contributes to a better removal of carbon dioxide from the compartments of the chamber during ventilation. The air is released from the chamber out on the street. The noise level is 81 db, and measures are being taken to lower it. Both compartments of the chamber have spring-type safety valves of the DU-80 mm design calibrated for 3 gauge atmospheres and sealed. They also have emergency decompression valves DU-70 mm.



The walls of the large chamber also have a horizontally mounted pharmacy lock (efficiency expert certificate No 322). It is a metal cylinder 200 mm long with a diameter of 150 mm. It is closed with tight hinged lids on both sides. The lids are tightened by threaded push rods. The walls of the pharmacy lock have two valves through which the pressure within and outside of the chamber is leveled. The pharmacy lock is one of the innovations in our pressure chamber. Due to it, it is possible to deliver the medicine and take materials for laboratory analysis without disturbing the operation mode of the chamber. In order to maintain the necessary temperature conditions, there is a heat exchanger installed in the system from the compressor after filters No 1 and No 2 (efficiency expert certificate No 323). It operates on the following principle: by running warm or hot water from the central water and heat supply systems of the hospital through a multitude of copper pipes, it is possible to change the temperature of the air entering the chamber. The chamber has a two-way communication system and an emergency communication system. The microclimate within both compartments of the pressure chamber is monitored by such automatic recording devices as a gas analyzer, barograph, thermograph, and hygrograph for visual determination of moisture content. The chamber has two fire-extinguishing systems: a hydrant system and a sprinkler system from two water-supply sources. One of them has a pump to be used when the pressure in the municipal network is low. The chamber is painted inside with a fireproof silicate paint.

Upon completion of construction, the chamber was tested for airtightness and strength. All assemblies were also checked. The chamber was accepted by VNIIMT [All-Union Scientific Research and Testing Institute of Medical Equipment] Committee.

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## PUBLIC HEALTH

### CIRCADIAN BIOCYCLES

Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 8 (377) 1977 pp 61-64

[Survey by M. L. Yefimov, Kazakh Scientific Research Institute of Oncology and Radiology]

[Text] Regular periodicity of light and darkness, seasonal changes in temperature, moisture, and atmospheric pressure, cyclicity of lunar tides, and shifts in the electric and ionization states of the atmosphere are reflections of oscillations occurring in the near space and in outer space. Being exposed to them, plants and animals in the process of evolution have developed a number of functions of adaptation to rhythmical shifts in the environment, due to which many aspects of the vital activity of the organisms undergo wave-like changes in a closed cycle, which was termed "biological cycles" or "biological hours." The rhythmicity of physiological processes as a general biologic phenomenon is of considerable interest from the viewpoint of the regulation and control of live systems.

Biological cycles may vary in their length and the amplitudes of their oscillations. For example, seasonal cycles of the functional activity of animals and man are generally known, particularly of such indexes as the pulse rate, orthostatic tests, body temperature, vascular tension, blood coagulability, and its morphological composition (Ye. Ye. Ushomirskaya and V. A. Matyukhin), oxygen consumption and the activity of the thyroid gland (V. F. Ushakov), potassium and sodium levels in the blood (M. I. Boguslavskaya), radiosensitivity (N. G. Darenskaya et al). In recent years, oscillations in the physical, psychic, and intellectual activity of man not coinciding in time have been discovered in the group of long biocycles with periods of 9-19 days, as well as weekly fluctuations of the motor activity of children.

In addition to the biocycles with relatively long periods, fluctuations in the physiological functions within the 24 hour period are also known. The daily (or circadian) cycle has received the most study and is characteristic of various aspects of the vital activity of organisms.

Studies on the circadian cycle have been focused on revealing the periodicity of the mitotic activity of tissues. It is quite clear that wherever cell multiplication takes place this process is subjected to regular fluctuations under the usual conditions of the photoperiodicity of the environment.

It is known that erythropoietic and granulopoietic cells in the bone marrow of rats multiply most intensively at 0900 hours, and that granulopoietic cells have another mitosis peak at 2000 hours (T. I. Uryadnitskaya). In the human bone marrow, a rise in the mitotic index was noted at 0300 hours and its minimum value at 1500 hours (M. A. Blank et al). The mucous membrane of the rat stomach has two maximums of mitotic activity -- at 0900 and 1800 hours (L. B. Klyukina). In the epithelium of the cornea and skin of mice, the highest level of the mitotic index was at 0800 and 0900 hours, and its fall-off was observed at 1700-2300 hours (N. V. Krasil'nikova; I. A. Alov; R. I. Bogatova-Nikanorova). In salivary glands, the epithelium of the intestines and the pancreas of mice, the mitosis maximum was detected at 0800 hours and at 2000-2300 hours, while at 1100-1700 and 0200-0500 hours the mitotic activity dropped sharply; fluctuations in the number of mitoses were also noted in the cortical substance of the kidneys with a rise at 0500-0800 hours and a drop at 1100-1700 hours (N. V. Krasil'nikova). A circadian cycle of mitoses was also found in zona glomerulosa and zona fasciculoreticulosa of the adrenal glands (R. I. Bogatova-Nikanorova).

With respect to other functions, it is known, for example, that there is a clear circadian cycle of the secretion of calcium and phosphorus in man, as well as of other macroelements and microelements (N. I. Denisevich). The levels of many amino acids in the blood plasma fluctuate during the 24-hour period. Circadian fluctuation in the amounts of arginine-rich and lysine-rich proteins have been revealed in the neurons of the medulla oblongata of rats with maximums at 1000 and 2200 hours (T. G. Raygorodskaya). The content of phenylalanine, ornithine, lysine, and arginine in the livers of rats reaches its maximum at 2200 hours, while tyrosine showed a peak at 1400 hours and a minimum at 1800 hours. In the same organ, there are circadian changes in the concentrations of RNA, glycogen (G. D. Gubin, R. M. Petrova), the inclusion of methionine- $S^{35}$  and  $C^{14}$ -leucine (V. I. Bulgak et al). The circadian cycle is characteristic of such indexes as the antioxidation activity of lipoids (A. V. Alekseyenko et al), the concentration of the paramagnetic centers in the liver (O. A. Kovalenko et al), the activity of the cold receptors in man (A. V. Volodina, L. M. Kurilova). There are circadian fluctuations in the radiosensitivity level of rats (V. F. Mikhaylov et al) and in the resistance of animals to hypoxia (N. A. Agadzhanian, A. M. Rafikov). The latter is connected with the circadian periodicity of the secretion of the adrenocortical hormones.

Tumors are of great interest for the study of circadian cycles, since they are tissue systems which are, to a considerable degree, outside of the controlling influence of the regulatory systems of the organism.

Cycles of mitotic activity have been revealed sufficiently clearly in many experimental tumors. As early as 1961-1963, the presence of considerable fluctuations in the mitotic index was shown in Erlikh's ascitic carcinoma. The mitosis maximum in this tumor, just as in ascitic sarcoma  $S_2$  and lymphoma Nk/Ly, was observed at 2000-2400 hours, and a minimum -- at 0800 hours (K. G. Moskalik). According to other data, the curve of the circadian changes of the mitotic index in Erlikh's ascitic carcinoma increased sharply at 0400

and 1000 hours with minimum levels at 0800 and 1600-1800 hours (G. S. Vasil'yeva, B. A. Kaliyeva). The same authors detected only one peak of mitoses in an ascitic tumor of the ovary in rats at 2000-2200 hours. Similar cycles of mitotic activity have also been described for many other tumors. An absolute minimum of mitoses in the carcinoma of the pregastric area in mice was registered at 0800 hours, and a maximum at 2400 hours; lymphosarcoma transplanted subcutaneously had a mitotic peak at 2000 hours, just as sarcoma 180, while the minimum number of mitoses was registered at 0400 hours in lymphosarcoma and at 0800 hours in sarcoma 180 (S. M. Kolomina). According to the data of S. I. Kharlampovich and T.P. Svinogeyeva, the highest mitotic activity in sarcoma IMP-1 was observed at 0400-0700 hours, and a minimum at 1300 hours; in sarcoma T-1, on the contrary, there was a peak of mitoses at 1300 hours, and minimum values were registered at 0700 and 1900 hours. It was observed that the mitotic activity of leukemic cells in mice was much higher at 1900 hours than at 0400 hours (V. I. Vasil'yeva).

With respect to other indexes of biological cycles in tumors, data are available on circadian variations in the sorption ability of cells of Erlikh's ascitic carcinoma (G. S. Vasil'yeva, B. A. Kaliyeva), and amounts of ribosomes in the cells of Yoshida's ascitic tumors. A marked circadian cycle was revealed when the content of radioactive phosphorus was measured in transplanted and induced tumors in rats (G. S. Vasil'yeva et al), as well as in some tumors of man (M. L. Yefimov et al).

Most likely, in a very general form, circadian cycles of the functional activity of normal tissues of animals are determined by the periodicity of light and darkness. However, the level of mitotic activity (and possibly of other indexes) does not depend directly on the light conditions, but depends on the phylogenetically formed mode of life, the time of the highest activity, and the time of sleep of the animals (S. S. Laguchev). This gave rise to the hypothesis regarding the key significance of the functional activity of organs and tissues and the period of their rest for the formation of circadian periodicity of mitoses and the regulation of mitotic activity. According to these researchers, the periodicity of the secretion of adrenaline and cortisone during the 24 hour period is particularly significant in this respect. As for the direct mechanism of the rise of mitotic activity, K. G. Moskalik points out that in this case many cells participate in mitosis, or, according to S. S. Laguchev, there takes place partial synchronization of cell division.

What could be the practical value of the discovered biological circadian cycles? V. N. Dobrokhotov draws attention to the fact that one of the important consequences of the existence of biological cycles is the difference in the responses of the organism to the action of the same factor used in various phases of the circadian cycles of the functions of the organism. It has been observed that the effect of adrenaline on the epithelium of the cornea during morning hours lowers the mitotic activity twice as much as in the evening, when there are generally few mitoses (N. F. Semenova). It has been found that the introduction of an antigen stimulated mitotic activity in the thymus of mice only when they were immunized in the morning, when

intact animals showed an increase in mitotic activity. Moreover, morning injections of cyclophosphamide intensified cell division, while evening injections inhibited it (V. V. Sinel'shchikova). The toxicity of preparations introduced at various hours of the 24-hour period was also found to be different. For example, the maximum and minimum death rate of mice was determined by the introduction of olivomycetin and 5-fluoruracil during the hours of the maximum and minimum of the number of mitoses in the kidneys (N. A. Lesnaya). Circadian variations of toxicity were also found for sarcolysin (N. A. Lesnaya, T. G. Lobova). Attempts have also been made to use circadian cycles for therapy. For example, the fact that patients suffering from rheumatism or infective arthritis have the minimum of the excretion of 17-oxy-corticosteroids during the period of 1800-2400 hours, and healthy people have it at 0-0600 hours, should be taken into consideration in prescribing the daily doses of hormonal preparations (M. Ye. Zverev). Attention to this fact is also drawn by Yu. A. Knyazev et al. They discovered a clear circadian cycle of the excretion of aldosterone, cortisol, catecholamines, and dihydroxyphenylalanine with urine in healthy children. In this connection, they believe that substitution therapy with hormonal preparations must be done in accordance with the circadian periodicity of the production of glucocorticoids.

Definite possibilities are opening up in the therapy of tumors. As early as 1958, Ye. Kaudri stated that "if it will be possible to detect peaks of mitotic activity in tumors and if it will be possible to predict the moment of the development of such a peak, then mitotic poisons used at that moment will inhibit the malignant growth more effectively than if they are introduced during a period when there are less mitoses." This hypothesis was confirmed by experiments. It was found that in a transplanted carcinoma of the mammary gland of a mouse the maximum of mitoses occurs at 0800 hours, and that the antitumoral effect of endoxan introduced during this period shows itself stronger than when it is administered at other hours of the 24-hour period. According to the data of T. P. Svinogeyeva and S. I. Kharlampovich, the use of sarcolysin during the period of high mitotic activity of sarcoma IMP-1 and sarcoma 45 hindered the growth of tumors and caused their regression to a greater degree than when the preparation was introduced during the periods of a minimum amount of mitoses. The effectiveness of the treatment of carcinoma OZh-5 in mice increased considerably if cyclophosphane was injected five hours before the onset of the peak of mitoses in comparison with the administration of the preparation five hours before the onset of the minimum of the mitotic activity (M. V. Berezkin, S. P. Arbuzov).

Clinical observations are of special interest. Children with acute leukosis were prescribed cytostatic drugs and antimetabolites in accordance with the circadian cycle of the level of the formed elements of the blood. In this case, remissions occurred 1-2 weeks earlier than in patients receiving preparations at regular intervals during the day (V. A. Tabolin et al).

Similar data were obtained during radiation treatment of experimental tumors depending on the mitotic cycle. In 1967, Fochem et al found that X-ray irradiation of Yoshida's sarcoma was more effective at 0900 hours than at

2100 hours. Later, it was shown by S. M. Kolomina and G. I. Roskin that radiation therapy of sarcoma 180 administered at 2000-2200 hours (maximum of mitoses) reliably hindered the growth of a tumor to a greater degree than when the irradiation was done at 0800-1000 hours, when the mitotic activity dropped. T. P. Svinogeyeva noted that the growth inhibition of sarcoma T-1 in rats constituted 35 percent if they were exposed to a dose of 900 r during the peak hours of mitoses, and only 7 percent when they were exposed during the period of the minimum values of the mitotic index. Still more striking results were obtained by S. I. Kharlampovich: X-ray irradiation (310 r) of sarcoma IMP-1 of rats during the period of the maximum of mitoses inhibited growth of the tumor by 96-99 percent, and 30 percent of the animals were completely cured; when sarcoma was irradiated at the moment of the minimum mitotic activity, the inhibition of its growth did not exceed 80 percent, and no animals were cured. It was observed recently by I. G. Gerinshteyn et al that the greatest changes in the morphological structure and enzymatic activity of the cells of sarcoma 45 occurred when the tumors were irradiated on the days and hours of the highest mitotic activity.

The problem of the preservation of the rhythm of mitoses after irradiation is of interest. In this respect, it is possible to refer to the work of L. P. Kosichenko which showed that gamma-irradiation of the cornea during the period of the maximum or minimum of the number of mitoses did not change the subsequent pattern of the circadian curve.

Such experiments undoubtedly confirmed the idea of possible utilization of mitotic cycles in tumors for planning an effective therapy scheme. However, everything is much more complicated with respect to tumors in man, since there is no practical possibility to establish regularities in the rhythm of mitoses in each individual tumor. Consequently, it becomes necessary to register circadian biocycles in human tumors by some other way without numerous biopsies for the estimation of mitoses. In this respect, it appears promising to have data on the presence of circadian cycles of the content of radioactive phosphorus in tumors which can be revealed without the trauma of the tumor. In fact, radiation therapy of tumors in animals and man conducted during the hours of the peak values of radioactivity proved to be much more effective than the same treatment conducted during the periods of its decrease of without consideration of the rhythm of the  $P^{32}$  content (M. L. Yefimov et al).

The purpose of this brief analysis of the present state of the problem of circadian biocycles is to draw the attention of researchers and physicians to the necessity of active utilization of the variations in the functional activity of normal and diseased organs for increasing the effectiveness of therapy.

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## PUBLIC HEALTH

### ON THE CONTENT OF CANCEROGENIC SUBSTANCES IN FOODSTUFFS

Alma-Ata ZDRAVOODKHRANENIYE KAZAKHSTANA in Russian No 8 (377), 1977 pp 70-72

[Article by B. A. Nemenko, Senior Scientist, G. S. Sabanbayeva, and M. M. Moldagulova, Junior Scientists, Laboratory of Cancerogenic Agents of the Environment, Kazakh Scientific Research Institute of Oncology and Radiology]

[Text] In many instances, foodstuffs containing cancerogenic substances may be classed among the unfavorable factors affecting the human organism. They can get into foodstuffs as additives changing their organoleptic properties, be present in the form of impurities, and, finally, form in the process of thermal processing of products.

The simplest and very widespread contamination of food is the contamination by cancerogenic substances contained in the environment (air, water, soil). This phenomenon is observed most frequently near specific sources of cancerogenic substances and is, chiefly, of industrial nature which later affect the everyday life. For example, vegetables grown in a soil contaminated by cancerogenic substances contain them in greater amounts than the control products. We have established that the concentration of chromium in the potatoes watered with water from chromium mines is 5-10 times higher than in the control specimens.

Having the data on the blastomogenic activity of some industrial compound, it is possible to eliminate completely its contact with foodstuffs in many cases. Both in our country and abroad, it is prohibited to add substances possessing cancerogenic properties to food. Many food additives have been removed from food technology, a number of materials are not used for packing foodstuffs, etc.

It is known that cancerogenic substances can form in the food in the process of its preparation and processing. At the present time, two types of such substances have received the most study: polycyclic aromatic carbohydrates (PAC) and nitrosamines. Quite recently (Stockholm, 1977), it was, finally, established that benz(a)pyrene is an indicator of the presence of PAC in the environment, which facilitates considerably the estimation of the degree of contamination by cancerogenic carbohydrates. Being a product of incomplete combustion of organic substances, benz(a)pyrene gets into

foodstuffs when they are being cured with smoke, as well as during thermal processing. It has been established by our studies that the content of cancerogenic substances in fats used for deep frying is directly proportional to the time of the thermal action.

The concentration of PAC in smoked and fried products varies within wide limits and, chiefly, depends on the method and time of the thermal processing of foodstuffs. At the present time, there are methods of smoking (the use of curing liquids) which eliminate the presence of PAC in smoked products fully preserving their organoleptic properties. The content of cancerogenic substances in fried products can be lowered by regulating the degree of thermal action.

Relatively recently, a new class of chemical cancerogenic substances has been isolated: nitrosamines which are now considered one of the main blastomogenic substances of man. Being characterized by the simplicity of their synthesis, nitrosamines can be present in various objects of the environment, including foodstuffs. Unfortunately, the methods of the analysis of nitroso compounds are quite complicated, due to which very few studies have been made of these cancerogenic substances. The majority of analytic reports are on foodstuffs.

Among all methods for the determination of nitrosamines known at the present time, gas chromatography is most sensitive and specific. However, such an analysis is possible only in large and well equipped laboratories and, consequently, cannot be conducted on a large scale. It should also be taken into consideration that the identification of individual nitrosamines is often of purely scientific interest and does not always have a practical value.

At the same time, there are methods for an overall determination of nitrosamines which can answer the most important practical question: whether or not cancerogenic nitroso compounds are present in foodstuffs. Two methods are of particular interest: calorimetric (Yu. M. Kann, O. V. Tauts, 1974) and chromatic (B. Kovalcki, 1975).

We used a combination of the two above-mentioned kinds of analysis for determining the presence of nitrosamines in foodstuffs. We analyzed a total of 30 specimens of foodstuffs, among them: fish -- 12, meat -- 7, sausages -- 5, beverages -- 4, other products -- 2 specimens. Analysis has shown that nitrosamines were present in five specimens among all specimens that were studied. Its concentrations were as follows: savelat -- 0.7 mg/kg, chuzhuk -- 0.4 mg/kg, smoked vobla (Caspian roach) -- 0.2 mg/kg, dried vobla -- 0.1 mg/kg, and dry-smoked mackerel -- 0.1 mg/kg.

Synthesis of nitrosamines is possible in the presence of amines and nitrites or nitrates, which is indicated by the term cancerogen itself. This reaction progresses most actively at high temperatures and in an acid medium. Human food contains large amounts of various amines and, in many instances, nitrates -- a second component necessary for the formation of nitrosamines. For example, until recently, saltpeter was added to meat products to preserve the

natural color of the meat. It is nitrite. Nitrites also get into food when certain methods are used for salting fish. This also leads to the formation of cancerogenic nitrosamines.

Some products of national cuisines (such as Kazakh) are exposed to long thermal effects, as well as to curing by smoke in order to preserve the product and to produce special organoleptic properties. When such procedures are used, nitric oxides contained in the smoke may get into the food. For example, according to Sander (1967), as much as 0.97 mg percent NO was found in dried fish, and this concentration, according to him, is not the highest. When the nitrates of the smoke interact with the amines of the food, there is a possibility of the synthesis of nitrosamines in it, not to mention the presence of benz(a)pyrene.

Such products of the Kazakh national cuisine include various types of smoked meat products, particularly, kazy and chuzhuk. Goatskins for storing kumiss and shubat (camel milk) are cured with smoke. According to A. N. Syzganov (1970), benz(a)pyrene was found in the blood of donors who used such kumiss. The method of storing butter in smoked sheep stomachs is used widely among animal breeders of Kazakhstan. Benz(a)pyrene which dissolves in butter very well was found in the walls of such containers. Unfortunately, no analyses were made for the content of nitroso compounds, but their presence in these products has been substantiated theoretically. We are carrying out such studies at the present time.

Quite often, some species of fish are smoked, although in most instances the Kazakh population is using dried fish. Nitrites could be present in salt and get into food when meat and fish are salted. However, our studies have shown that the food salt used in Kazakhstan does not contain nitrites, and that nitrates are present in it in the form of traces.

There is a national method of baking flat cakes in round stoves -- tandyr. Raw dough is stuck to the inner walls where it stays until the cake is done. The cakes could be contaminated by products of incomplete combustion of the fuel both from the source of fire and from the walls of the stove.

The detection of nitrosamines in the products studied by us confirms the theoretical premises stated above. The highest concentrations of the cancerogen were contained in products subjected to smoking, but they were not found in most of the specimens. Consequently, the formation of nitrosamines is impossible in the absence of nitrites or nitrates.

From the viewpoint of the prevention of malignant tumors, it is necessary to consider all possible factors contributing to the presence of cancerogenic substances in foodstuffs. In many countries, it is prohibited to use nitrites and nitrates as food additives and to use a number of substances in the food industry. Experimental and analytical studies in this direction will also contribute to the prevention of the chemical carcinogenesis.

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PUBLIC HEALTH

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THE COMPOSITION OF PATIENTS' POPULATION AND THE TIME OF THEIR STAY IN INTERNAL DISEASES DEPARTMENTS OF HOSPITALS IN THE CITY OF KIEV

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, 1977 pp 23-27

[Article by Professor P. L. Shupik, Candidates of Medical Sciences I. N. Dmitryuk and A. V. Zamyatina, Department of Social Hygiene and Public Health Organization (Professor P. L. Shupik, Director) of the Kiev Institute for Advanced Training of Doctors]

[Text] Materials of 35 hospitals of the system of the Kiev Municipal Health Department were used to study the composition of patients hospitalized in internal diseases departments, the time of their stay in general therapeutic and specialized departments, the length of hospitalization of patients with various nosologic forms, distribution of patients according to agencies which prescribed their hospitalization, etc.

We copied 16,602 case histories on a specially developed chart, including 8,422 cases of patients released from general therapeutic hospitals, 7,050 case histories of patients released from specialized therapeutic hospitals and 1,130 case histories of persons who died in these hospitals.

The representative nature of the selection was determined separately for each type of hospitals, and the case histories of patients who died in therapeutic hospitals were copied in full.

The structure of patients in therapeutic hospitals of Kiev was represented by 17 classes of diseases (Class XV "some causes of perinatal disease rate and mortality" was excluded) and under the heading "Additional Classifications" (see Table).

As can be seen from the Table, the most frequent cases in hospitals are those with diseases of the blood-circulation system, respiratory organs, and digestive organs. These three classes of diseases include 76.3 percent of all cases for which the patients were hospitalized in therapeutic departments of hospitals.

Table

Classes of Diseases	Total Number of Patients, Percent
I. Infectious and parasitic diseases.	1.10
II. Tumors.	2.70
III. Diseases of the endocrine system, nutritive disturbances and metabolic disturbances.	4.40
IV. Diseases of the blood and hematopoietic organs.	0.20
V. Psychic disorders.	2.70
VI. Diseases of the nervous system and sense organs.	0.70
VII. Diseases of the blood circulation system.	33.00
VIII. Diseases of respiratory organs.	19.60
IX. Diseases of digestive organs.	24.10
X. Diseases of genitourinary organs.	1.40
XI. Complications of pregnancy, childbirth, and the postnatal period.	0.07
XII. Diseases of the skin and subcutaneous cellular tissue.	1.10
XIII. Diseases of the osteomuscular system and connective tissues.	2.10
XIV. Congenital anomalies.	0.14
XV. Symptoms and unclear states.	0.09
XVI. Accidents, poisoning cases and traumas (classification according to external cause).	4.00
XVII. Accidents, poisoning cases and traumas (classification according to their nature)	2.21
Additional classifications.	0.40
Total	100.0

The hospitalized patients included 48.2 percent of men and 51.8 percent of women. This sex ratio is characteristic of the composition of patients in general therapeutic and specialized therapeutic departments.

The group of patients 15-49 years of age discharged from hospitals constituted 57.2 percent, 50-59 years of age -- 17.1 percent, 60 years of age and older -- 26.7 percent. Among all the patients, 68.2 percent were working or studying; this included 41.6 percent of workmen, 22.0 percent of employees, and 4.6 percent of students. Pensioners and dependents constituted 29.0 percent. No information was obtained on the occupations of 2.8 percent of patients released from hospitals.

The majority of patients (69.8 percent) were hospitalized according to regular procedures, and 30.2 percent according to emergency indexes.

Physicians of polyclinics and medical and sanitary units hospitalized 63.7 percent of all patients, emergency physicians hospitalized 25.1 percent, and 9.8 percent were hospitalized by directors of medical establishments and public health agencies, and 1.4 percent of the patients were transferred from other departments or hospitals to therapeutic departments.

We distributed all the patients into three groups depending on the length of their stay in the hospitals: the first group included people staying in hospitals up to five days, the second group -- from 6 to 29 days, and the third group -- 30 days and more.

Among all patients, 11.6 percent were hospitalized for short periods of time (up to five days), 63.3 percent stayed in the hospital from 6 to 29 days from the beginning of hospitalization, and 25.1 percent stayed for 30 days and more.

According to our data, the percentage of patients who spent short periods of time in the therapeutic departments of the hospitals does not exceed the limits obtained by other authors. According to the data obtained by V. A. Minyayeva, the percentage of patients hospitalized for short periods of time was 7.7 percent, according to S. Ya. Freydlin -- 10.6 percent, and according to G. M. Semenov -- 19.0 percent. In the studies conducted by S. N. Zorina, short term hospitalization in the therapeutic departments of hospitals in Kiev constituted 10.6 percent of the cases.

Most frequently (44.7 percent of the cases), patients were hospitalized for periods of up to five days due to traumas, accidents, and poisoning. The reasons for the short-term hospitalization were: 13.3 percent -- various diseases of the blood-circulation system, 11.9 percent diseases of digestive organs, and 9.1 percent -- respiratory organs.

Patients hospitalized for periods of up to five days included 76.8 percent of persons up to 50 years of age (among them, 42.9 percent of patients up to 30 years of age).

Among the patients hospitalized for short periods of time, 65.4 percent were hospitalized by physicians of the ambulance and emergency medical services, 23.7 percent were referred by polyclinics, 9.7 percent were referred by directors of medical establishments and public health agencies, and 1.2 percent were transferred to therapeutic departments from other departments of the hospitals. The necessity of emergency hospitalization was determined for 68.2 percent of the patients of this group, and 31.8 percent were hospitalized according to regular procedures. Some of these patients were brought in by physicians of ambulance and emergency services from the streets, from public places, and from enterprises and institutions.

Short-term hospitalization was found to be sufficient also for patients who, due to the nature of their pathological states (poisoning, emergency states, such as coma, acute manifestations of allergy, etc) did not require long-term hospitalization because they were given timely, complete, and skilled medical attention in the hospital.

However, no explanation can be found for short-term hospitalization of patients referred by polyclinics according to regular procedures, especially because most of these patients were released after short-term hospitalization with diseases of the circulatory system, respiratory organs, digestive organs,

and infectious and parasitic diseases. Probably, the short-term hospitalization of these patients in hospitals cannot be an evidence of expedient utilization of hospital beds. It does not seem possible to believe that the patient's health can be improved considerably during such a short period of hospitalization. Most probably, this indicates insufficiently clear policies for the selection of patients for hospitalization and determination of their need in hospital care, which must be attributed to the defects in the organization of the work of the polyclinics.

It is also impermissible for the administrators of public health institutions and agencies to refer patients to hospitals without the necessary findings by specialists. According to our data this group constituted 9.7 percent of patients among those hospitalized for short periods of time.

The data on the patients who died in therapeutic departments indicate that 41.2 percent died after short-term hospitalization. Most of them (73.1 percent) were elderly people, 60 years of age and older, and 81.6 percent of death cases were pensioners and dependents brought to hospitals by physicians of ambulance and emergency services due to their emergency conditions.

In the structure of the causes of deaths among patients who died during the period of short-term hospitalization, the first place (64.5 percent) belonged to patients with diseases of the circulatory system, most of them (86.3 percent) being patients with various forms of ischemic heart diseases. During this time, the causes of death for 15.7 percent of the patients were diseases of respiratory organs, for 7.1 percent -- tumors, for 4.3 percent -- diseases of digestive organs, and for 2.6 percent -- diseases of urogenital organs. Other classes of diseases in the structure of the causes of deaths constituted 1 percent and fractions of 1 percent.

In analyzing the data on the death cases after short-term hospitalization, the group of patients who died of tumors (7.1 percent) attracts attention; they were referred, chiefly, by physicians of polyclinics according to regular procedures. Hospitalization of oncologic patients in a terminal state in therapeutic hospitals must, undoubtedly, be regarded as a defect in the work of the polyclinics. The same evaluation should be given to the data on the death cases after a short-term hospitalization of patients referred by physicians of polyclinics with diagnosed diseases of the circulatory system.

Patients hospitalized in therapeutic departments of hospitals for 6-29 days constituted 63.3 percent. The structure of the cases of these patients differed substantially from that in the group discussed above. Here, the majority of the cases were patients with diseases of the circulatory system (29.5 percent), digestive organs (27.3 percent), respiratory organs (24.3 percent), and diseases of the endocrine system, nutritional disorders, and metabolic disorders (5.2 percent). The age structure was also different: there were 59.7 percent of persons up to 50 years of age (against 76.8 percent of short-term patients), and 22.8 percent of patients 60 years old and older (against 12.5 percent).



The majority of the patients of this group (70.0 percent) were referred to therapeutic departments according to regular procedures by physicians of polyclinics and medical and sanitary units; 17.9 percent were referred by physicians of ambulance and emergency services; 11.3 percent were referred by administrators of medical institutions and public health agencies. The remaining patients of this group were transferred to therapeutic departments from other hospitals and departments (0.8 percent).

The most frequent causes of deaths among patients hospitalized for 6-29 days were diseases of the circulatory system. Their percentage in the structure of the causes of death was lower than among patients hospitalized for short periods (54.3 percent against 64.5 percent), and the percentage of death cases due to diseases of respiratory organs was also lower (12.6 percent against 15.7 percent). However, the percentage of patients who died from tumors was considerably higher (25.7 percent).

Among the death cases, 76.0 percent were patients 60 years of age and older (pensioners and dependents hospitalized according to regular procedures and referred, chiefly, by physicians of polyclinics); 5.3 percent of death cases were patients referred by administrators of institutions and public health agencies. These patients died, chiefly, due to diseases of the circulatory system and tumors.

The share of the patients hospitalized in therapeutic departments for long periods of time (30 days and longer) constituted 25.1 percent in relation to the entire group under study. Among them, 44.3 percent received long-term treatment in connection with diseases of the circulatory system, 27.2 percent -- diseases of the digestive organs, and 14.6 percent -- diseases of the respiratory organs. In the structure of the cases of these patients, the percentage of persons with diseases of the osteomuscular system and connective tissues was twice as high as among patients hospitalized for 6-29 days.

Analysis of the age composition of these patients indicates that half of them were 50 years old and older, while persons 60 years old and older constituted 29.8 percent. The predominance of patients of older age groups was also the reason for the increase of the percentage of pensioners and dependents to 32.0 percent.

The majority of these patients (70.1 percent) were referred to hospitals by physicians of polyclinics and medical and sanitary units according to regular procedures, and 19.5 percent were hospitalized by physicians of the ambulance and emergency services. The percentage of the referrals of patients by directors of public health institutions and agencies decreased somewhat in comparison with the preceding group (8.7 percent). The remaining patients (1.7 percent) were transferred to therapeutic departments from other hospitals and departments.

The structure of the causes of death among patients with this length of hospitalization was characterized by the fact that 40.6 percent of death cases were caused by tumors of various localizations. The second place in this structure (40.0 percent) belonged to the diseases of the circulatory system. On the other hand, there was a decrease in the percentage of death cases caused by diseases of respiratory organs (8.7 percent), digestive organs (4.7 percent), and urogenital organs (2.4 percent). Death cases from ischemic diseases of the heart were considerably lower in this group of patients (up to 27.6 percent).

The majority of the death cases in this group (72.3 percent) were patients 60 years old and older. All patients of this group were hospitalized by physicians of polyclinics and medical and sanitary units according to regular procedures.

Thus, the study conducted by us on the structure of patients discharged from therapeutic departments of hospitals and death cases, as well as the structure of the disease rate among hospitalized patients and causes of death during various periods of hospitalization in the departments, made it possible to reveal certain specific features: 20.3 percent died of tumors of various localization, which occupied the second place among other diseases. Oncological patients who died in therapeutic departments were referred by physicians of polyclinics according to usual procedures, chiefly with diagnosed tumors, and it was not clearly indicated that they had to go to therapeutic hospitals, when there were specialized hospitals for this purpose. At the same time, the largest number of persons who died during the period of short-term hospitalization in therapeutic hospitals, died chiefly of diseases of the circulation system. It should be assumed that they were admitted to the hospitals in grave and, possibly, irreversible states and, therefore, they were, probably, hospitalized too late. These data make it possible to believe that there are substantial defects in the organization of the hospitalization of patients.

The data obtained by us can be used for improving the organization of the system of hospitalizing patients in therapeutic hospitals.

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SOME DATA ON THE DISEASE RATE AMONG PHYSICIANS AND PARAMEDICAL PERSONNEL OF URBAN HOSPITALS AND POLYCLINICS INVOLVING TEMPORARY DISABILITY

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, 1977 pp 44-47

[Article by Candidates of Medical Sciences A. N. Grachev and Ya. G. Vol'finzov (deceased), Department of Social Hygiene and Public Health Organization (Yu. A. Dobrovol'skiy, Director, deceased) of the Leningrad Institute of Advanced Training of Physicians]

[Text] The 25th CPSU Congress gave an important task to the public health service: to ensure further improvement of health protection for the Soviet people by improving the quality of work. The solution of this problem depends considerably on the everyday care for the improvement of the work, living conditions, and health protection of medical workers. In this connection, the study of various aspects of their disease rates is necessary for the public health agencies, primarily, for rational planning of measures for the improvement of their working conditions and medical care.

Research materials have been published by a number of authors (G. I. Galantseva, F. F. Gudoshnikov, K. A. Livshits, A. G. Sarkisov, Ya. S. Braginskiy, and others), who studied the general disease rates among physicians of therapeutic and prophylactic establishments. At the same time, there are only isolated reports treating the problems of disease rates among medical workers involving temporary disability.

Our goal was to study the disease rate with temporary disability among physicians and paramedical personnel in two large therapeutic and prophylactic establishments of Leningrad. We selected the 360-bed unified and diversified Hospital No 20 with a polyclinic in the Moscow district and the nonunified Polyclinic No 51 serving more than 50,000 residents of the same district.

We copied 2,253 paid disability slips for 1968, 1969, and 1970 on a specially developed statistical form, which corresponds to the number of disease rates with temporary disability among physicians and paramedical personnel in the above-mentioned groups. All forms were analyzed in order to eliminate duplicates and were subjected to statistical processing. Sex distribution was not given in the group of paramedical workers, because there was only one man among 403.9 persons in the annual average.

Statistical materials were developed in application to the international statistical classification of diseases, traumas, and causes of death of the eighth revision; isolated cases were classed with the group of other diseases. The number of cases and days of illness were calculated per 100 people (annual average).

Women constituted 86 percent of the total number of physicians, which was somewhat higher than the average union index (72 percent). The distribution of medical certificates by individual types of disability is shown in Table 1.

Table 1  
Distribution of the Disability of Physicians and Paramedical Personnel by Its Types (in percent)

Type of Disability	Physicians		Paramedical Personnel
	Men	Women	(women)
Illness.	100.0	83.4	77.6
Care for sick people.	--	12.4	17.2
Sanatorium and health resort treatment.	--	1.1	0.8
Prenatal and postnatal leave.	--	3.1	4.4
Total	100.0	100.0	100.0

As can be seen from Table 1, illnesses are the main cause of temporary disability. The same ratio of the types of disability, as is known, has been observed in other branches of the industrial and nonindustrial spheres of the national economy.

Indexes of the disease rate with temporary disability per 100 workers are shown in Table 2.

Table 2  
Disease Rate with Temporary Disability Among Physicians and Paramedical Personnel in Absolute Figures and per 100 Workers for 1968, 1969, and 1970 (annual average)

Categories of Medical Personnel	Number of Cases	
	Absolute	Per 100 workers
Male Physicians	33.3	119.0
Female Physicians	214.6	124.1
Paramedical Personnel	355.7	84.3

As can be seen from Table 2, the indexes of illnesses with temporary disability among men and women are not much different, although they are higher among women. At the same time, these indexes are considerably lower for paramedical personnel than for physicians.

This difference in the indexes can be explained by the fact that young people constitute a considerably larger part of the paramedical personnel than among the physicians: 73.3 percent among the paramedical personnel and only 53.6 percent among the physicians are below 40 years of age.

**Table 3**  
**Distribution of Physicians and Paramedical Personnel**  
**by the Length of Disability (in percent)**

Категория медицинских работников (1)	(5) Длительность нетрудоспособности, дни						Всего (8)
	(6) до 3	4-6	7-10	10-15	16-20	(7) 20 и более	
(2) Врачи-мужчины	6,0	20,0	17,0	21,0	14,0	22,0	100,0
(3) Врачи-женщины	9,5	31,7	24,8	22,2	5,4	6,4	100,0
(4) Средний персонал	8,1	36,7	24,1	18,3	6,5	6,3	100,0

Key: 1. Categories of medical personnel      5. Length of disability, days  
 2. Male physicians                              6. Up to  
 3. Female physicians                          7. 20 and more  
 4. Paramedical personnel                    8. Total

The distribution of various categories of medical workers with respect to the length of disability is shown in Table 3. In all three groups of medical workers the largest proportion is among those whose disability certificates were issued for periods from 4 to 15 days, and there were fewer male physicians with this length of certificates than female physicians and paramedical workers; at the same time, the number of male physicians with disabilities of 16-20 days and more was found to be higher. It should also be mentioned that the percentage of workers having hospital certificates from 3 to 6 days was, according to our observations, was considerably lower in comparison with the percentages obtained by other researchers for municipal polyclinics.

Considering the fact that almost all paramedical workers are women and the number of men in the group of physicians is also extremely small, we are giving the data on the disease rates among paramedical workers and female physicians in Table 4.

It can be seen from Table 4 that there is a considerable difference in the indexes of diseases with temporary disability (number of cases per 100 workers) between female physicians and paramedical workers. At the same time, there is no substantial difference in the levels of acute respiratory illnesses, heart diseases, tonsillitis, and industrial traumas. It was noted that paramedical personnel had higher indexes of temporary disability caused by other diseases, and that there were also instances of disability in connection with pulmonary tuberculosis. Diseases of female genital organs among physicians as a cause of temporary disability was established only in individual cases, and, therefore, they were included in the group of other illnesses. Infectious diseases, which are recorded in form No 58, are not shown separately in Table 4 because they were not registered in the course of three years among physicians and paramedical personnel of the studied groups.

At the same time, there is a higher disease rate with temporary disability resulting from hypertonic diseases, flu, pneumonia, and bronchitis among

**Table 4**  
**Indexes of the Frequency of Individual Illnesses with Temporary Disability**  
**Among Female Physicians and Paramedical Personnel in 1968, 1969, and 1977**  
**(annual average)**

Нозологическая форма (1)	(2) Число случаев на 100 работающих	
	(3) врачей-женщин	(4) средних медицин- ских работников
Гипертоническая болезнь (5)	6,0	4,1
Заболевания сердца (6)	2,9	2,5
Туберкулез легких (7)	—	0,9
Грипп (7)	20,2	16,3
Острые респираторные заболевания (9)	12,6	12,1
Ангина (10)	6,6	6,9
Пневмония (11)	23,2	9,3
Бронхит и другие заболевания органов дыха- ния (12)	6,3	2,8
Болезни органов пищеварения (13)	10,2	6,2
Болезни женских половых органов (14)	—	5,0
Болезни мочеполовых органов (15)	6,9	2,2
Болезни вен (16)	3,9	1,1
Болезни кожи и подкожной клетчатки (17)	7,4	1,5
Пояснично-крестцовый радикулит (18)	3,5	1,4
Новообразования (19)	8,5	0,7
Производственные травмы (20)	3,5	3,9
Прочие заболевания (21)	2,4	7,4
<b>Всего . . . (22)</b>	<b>124,1</b>	<b>84,3</b>

- Key:
- |                                    |                                                         |
|------------------------------------|---------------------------------------------------------|
| 1. Nosologic form                  | 12. Bronchitis and other diseases of respiratory organs |
| 2. Number of cases per 100 workers | 13. Diseases of digestive organs                        |
| 3. Female physicians               | 14. Diseases of female genital organs                   |
| 4. Paramedical personnel           | 15. Diseases of urogenital organs                       |
| 5. Hypertonic disease              | 16. Diseases of veins                                   |
| 6. Heart diseases                  | 17. Diseases of skin and subcutaneous tissues           |
| 7. Pulmonary tuberculosis          | 18. Lumbosacral radiculitis                             |
| 8. Flu                             | 19. Tumors                                              |
| 9. Acute respiratory diseases      | 20. Industrial traumas                                  |
| 10. Tonsillitis                    |                                                         |
| 11. Pneumonia                      |                                                         |
|                                    | 21. Other diseases                                      |
|                                    | 22. Total                                               |

female physicians in comparison with paramedical workers. There is a still greater difference in the levels of the rates of the diseases of urogenital organs, lumbosacral radiculitis, diseases of the skin and subcutaneous cellular tissue, and tumors. This difference in the indexes of many diseases is, evidently, due to the specific characteristics of the work of physicians.

There were 10.2 percent of female physicians and 12.1 percent of paramedical workers who were hospitalized. We observed the difference in the structure of hospitalized cases among the above-mentioned groups of medical workers.

For example, the causes for hospitalization in the group of female physicians were pneumonia (21.5 percent) and diseases of the digestive organs (20.2 percent) including cholecystocholangitis (13.9 percent). The reasons for hospitalization in the group of paramedical workers were as follows: pneumonia (13.2 percent), threatening miscarriage (9.6 percent), complications of pregnancy and childbirth (7.8 percent), diseases of digestive organs (7.2 percent, including cholecystocholangitis 5.9 percent) and traumas (5.9 percent).

The data obtained by us can be used for improving medical aid to physicians and paramedical workers.

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PUBLIC HEALTH

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CONSIDERATION OF PROPOSALS, APPLICATIONS, AND COMPLAINTS OF CITIZENS AT THE PUBLIC HEALTH DEPARTMENTS

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 9, 1977 pp 47-52

[Article by B. D. Reznikov and V. I. Novoselov (Saratov)]

[Text] Citizens' suggestions and applications to public health agencies are one of the forms of active participation of workers in the organization of public health services.

The great significance of letters of the workers in the solution of many state-wide problems was noted by L. I. Brezhnev in his report at the 25th CPSU Congress.

L. I. Brezhnev said: "One of the important forms of the connection of our party and its Central Committee with the masses are letters of the workers. Their number is steadily increasing, reflecting the growing social activity of the Soviet people. They express the support of the policy of the party and opinions with regard to many basic problems of the life of the party and state.

The Central Committee is informed regularly regarding everything that deserves attention in the letters of the workers. The most important suggestions and opinions are examined by the Political Bureau and the Secretariat of the Central Committee and are taken into consideration in developing resolutions and laws. Many of them have also been used in the preparation of the materials of this Congress."\*

In the area of public health services, people's proposals contribute to the introduction of new types of medical aid and various measures intended for further improvement of the protection of human health. For example, in Saratovskaya Oblast, proposals by residents were used widely in solving one of the urgent problems of the oblast: bringing specialized medical care closer to the rural population. Their suggestions were also taken into consideration in the reassignment of beds for specific cases in rural district hospitals, in the introduction of a number of latest methods, etc.

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\*Materials of the 25th CPSU Congress, Moscow Politizdat, 1976, pp 66-67.



All this indicates that letters of citizens have a legal significance and contribute to a fuller satisfaction of the needs of the workers.

Considering the exceptionally important significance of letters from citizens addressed to the government and public organizations, the Communist Party and the Soviet government have been giving more and more attention to progressive improvement of standardized legal procedures for handling various suggestions and complaints of the citizens, strict observance of the established procedures for their handling, and the possibility of a wider use of their suggestions, recommendations, and opinions in practical work.

The main enforceable enactment legally securing and enhancing the right of the citizens to appeal to state and public organizations is the Decree of the Presidium of the USSR Supreme Soviet dated 12 April 1968 "On the Procedures for Handling Suggestions, Applications, and Complaints of Citizens." It establishes the obligations of these agencies in connection with timely and accurate examination of various types of appeals from the citizens and sets up various procedures. Moreover, the decree treats the organizational and legal problems of the examination of appeals, guaranteeing strict observance of legality and state discipline (control of local Soviets of Working People's Deputies and agencies of sectorial and departmental administration over the procedures of handling citizens' appeals, etc).

The organizational and technical problems of handling citizens' appeals are regulated in the Principle Regulations of the Unified State System of Office Procedures, as well as in the instructions on procedures in all systems of state agencies and in individual agencies, including agencies of public health administration and in treatment and prophylactic establishments.

There is no need to prove the importance of correct organization of work in handling citizens' appeals to public health agencies and establishments: the documents and enforceable enactments pertaining to the improvement of work with suggestions, applications, and complaints of the citizens apply fully to the public health area.

At the same time, the established procedure of handling citizens' appeals is not always observed in public health agencies and establishments. There are instances when the deadlines established by law for the examination of appeals are not observed; there are delays in forwarding materials necessary for correct resolution of complaints from lower to higher agencies; ineffective settlement of appeals which do not require additional verification, etc.

It is obvious that all administrators and other workers of public health establishments and agencies must be more familiar with the general rules of handling citizens' appeals and their examination in the public health system with consideration for the special nature of relations in the area of public health and competence of various agencies. Let us dwell on some most important problems of handling citizens' appeals at administrative agencies of public health services and in the treatment and prophylactic establishments.

The legislation on the procedures for examining suggestions, applications, and complaints from the citizens stipulates the necessity of duly and correct registration of citizens' appeals to state agencies. This is ensured by compulsory recording of letters, as well as of the main stages of their handling in the institution.

Verbal applications and complaints of citizens must also be recorded (in special journals). The existing rule must be observed: personal interviews are handled by administrators of the appropriate agencies or by other officials having the authority to settle the requests of the citizens. Such persons in the oblast public health department are: the head of the department, his assistants, the head of the treatment sector, and chief specialists. The register of personal appointments must include not only the main data on the persons coming with requests, but also the decisions made by the officials.

According to the present-day requirements for the examination of requests and complaints of citizens, a letter or a verbal request is not considered as "closed" after it is answered. After the fulfillment of a concrete request, it is necessary to analyze all requests received during a period (month, quarter, six months, a year).

Analysis of verbal and written requests of citizens addressed to public health agencies makes it possible to obtain information on the essence of their requests, the state of medical services to the population, observance of laws in subordinate organizations, and promising trends in further development of various types of treatment and prophylactic services. There are many analysis criteria, and the administrative agencies and public health institutions can conduct regular and individual generalizations on the problems of interest to them on the basis of practical needs.

In the process of analysis, the most characteristic peculiarities of applications, suggestions, reports, and complaints are often revealed. This makes it possible to map out the necessary measures for the improvement of public health services.

Increased numbers of reports for some period cannot serve by itself as a basis for any concrete conclusion.

Let us assume that in 1975 a department received 200 letters from citizens, and 250 in 1976. There is an evident increase in the number of reports. But this fact does not give a basis to conclude that the work of the department or its subordinate public health organizations has become worse. It is necessary to study the nature of the reports. If there are 20 suggestions, 150 reports, and 30 complaints among the 200 letters, and 50 suggestions, 190 reports, and 10 complaints among 250 letters, then there is a basis to say that the work of the department and its subordinate institutions has improved.

An increase in the number of letters with suggestions is a positive phenomenon which indicates an increasing social and political activity of the citizens, their interest in further improvement of the public health system in the country, in each republic, oblast, etc. Increased numbers of reports should not be considered as a negative phenomenon since the interest of the population in the area of public health is increasing. They are in line with the care of the Communist Party and the Soviet government for the health of the people as the most important goal which is not only of personal, but also of state significance. However, an increased amount of justified complaints is an alarming factor. It indicates either legal violations or other defects and makes it necessary to take measures for improving the work of public health agencies and institutions, their individual services and workers, and to improve the quality of work of the medical and other personnel of public health institutions.

The techniques of the analysis of the nature of requests is not complicated. When a letter is registered, an appropriate remark is made on the registration card ("suggestion," "report," "complaint"). In Saratov's executive committees of municipal and rayon Soviets of Working People's Deputies and their public health departments, reports are registered on cards with a green stripe, complaints with a red stripe, and suggestions on cards without a stripe. This makes it possible to compute the number of letters for each type with a minimum expenditure of time.

Each of the types of letters can be divided into several subtypes, which will give a clearer picture of the situation. Suggestions can be classified additionally according to concrete problems. For example, it is possible to count up suggestions about the development of the network of public health institutions, changing their operating conditions, introduction of new types of medical services, new methods of diagnosis and treatment, improvement of the educational work with the medical personnel, material and technical facilities of public health institutions, etc. Applications can be subdivided into the following groups: about the orientation toward specialized treatment, explanations on the procedures of applications of drugs or individual methods of treatment, etc. Complaints can reveal violations by medical and other workers of public health institutions of their professional duties, disregard for the requirements of medical ethics, improper treatment, refusal to satisfy the rights of the citizens, divulgence of medical secrets, etc.

In order to obtain a clear picture of who addresses public health agencies and institutions through letters or directly, it is necessary to have a different classification. Their authors could be the citizens (population) and workers of the subordinate public health agencies and institutions. Naturally, the contents of reports in the first and second cases will differ substantially.

Naturally, the contents of requests from the population pertain chiefly to the problems of medical services, while requests from employees of subordinate organizations are on the subject of work, wages, housing, etc. These two independent groups of requests must be differentiated in the registers

and similar surveys (records). Some other variants of classification can also be used: urban and rural population, industrial workers, transportation workers, etc. Requests from the employees of institutions can be classified by the place of employment and by other characteristics.

Principal duties of agencies and officials are described in the above-mentioned Decree of the Presidium of the USSR Supreme Soviet dated 12 April 1968 and are well known to all workers handling citizens' requests. We shall mention only some of the requirements stated in the decree: written requests must be taken care of within one month (and reports and complaints not requiring additional study and verification must be taken care of immediately, but no later than 15 days after they have been received by the agency which must take care of the complaint); it is not permitted to forward citizens' complaints to the officials whose actions are the reason for the complaint, etc.

If a citizen is asking for an unlawful action, it is necessary to explain this to him.

Clear answers to citizens' requests will eliminate such undesirable phenomena as repeated requests on the same problems addressed to higher agencies, such as the Ministry of Health, executive committees of the oblast Soviets of Working People's Deputies, etc. Solution of the majority of problems received from the citizens is within the competence of lower control agencies of the public health services (for example, public health departments of rayon executive committees) or, directly, the public health institution (hospital, rayon sanitary and epidemiological station, etc). Having received an answer which does not satisfy him because it is not clear, indefinite, or not formulated convincingly, the citizen, naturally, believes that his request was not given proper attention, and, therefore, repeats his request to a higher agency which instructs its subordinate agency to reexamine the request, etc. All this creates unnecessary correspondence, requires additional time for solving a concrete problem (sometimes a complicated one), and, what is more important, causes inconvenience to the citizens.

It is known that not all requests of the citizens can be satisfied immediately. For example, this refers to requests concerning a highly specialized medical care, about referrals for consultation with specialists in narrow areas of medicine, about help in obtaining certain medicines, etc. Therefore, the replies to the citizens (both oral and written) must state when, approximately, and under what conditions their requests can be satisfied. In order to assure the satisfaction of citizens' requests, such promises must be registered. There are no laws or instructions for prescribed methods of registering the requests of the citizens when promises are given to satisfy them. For example, in the public health department of the Saratov Oblast Executive Committee, and in rayon and city departments, there are special registers in which the essence of the promise and the approximate time of its fulfillment are registered.

There are a number of possibilities to improve the work with letters of citizens and the organization of personal interviews in all public health agencies and institutions. In order to ensure a very strict observance of the procedures for the examination of citizens' applications in public health institutions and control agencies, these problems should be discussed more often at the business meetings and staff conferences.

All newly appointed administrators must be instructed on the enforced procedures of the examination of citizens' applications.

Generalized information on citizens' applications can serve as a basis for drafting letters (presentations, reports, etc) to executive committees of local Soviets of Working People's Deputies, to other agencies, and to administrators of enterprises. Such letters can be prepared, for example, on the basis of violations of sanitation laws by enterprises, etc.

For example, sanitation control agencies of Saratovskaya Oblast submitted demands to the administrators of the farms of the Ozinskiy and Sovetskiy Rayons to eliminate water supply shortage for the population on the basis of the generalization of the letters of the workers.

As a result of joint efforts of local Soviets, economic organizations, and public health agencies, a water line of 9.7 km will be put into operation in the village of Pigara, Ozinskiy Rayon. Two artesian wells have been drilled in the Sovetskoye Workmen's Settlement, etc.

Each administrator and technical workers handling citizens' requests must realize their personal responsibility for strict observance of Lenin's principles pertaining to the work with citizens' requests and the legal norms. Disciplinary sanctions must be used against the violators whenever necessary.

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INDICES AND TRENDS OF THE DEVELOPMENT OF CLINICAL LABORATORY DIAGNOSIS AT THE PRESENT STAGE

Moscow LABORATORNOYE DELO in Russian No 9, 1977 pp 515-520

[Article by V. V. Men'shikov, N. A. Makarova, A. M. Markova, and T. D. Bol'shakova]

[Text] During the Ninth Five-Year Plan the USSR Ministry of Public Health implemented a number of measures to expand and improve our country's clinical diagnostic laboratory service. An analysis of these statistics would provide an impression of both the results of this work and the general level of development of laboratories at the threshold of the 60th anniversary of the Great October Socialist Revolution.

The improvements made in 1970 in the way therapeutic-preventive institutions report the activities of clinical diagnostic laboratories have made it possible to obtain a certain impression about some trends in the number and structure of laboratory analyses performed by these laboratories for patients in our country's hospitals and polyclinic outpatient institutions.

It follows from the statistical summaries of the annual reports of agencies in the USSR Ministry of Public Health's public health system that the quantity of analyses in clinical diagnostic laboratories at therapeutic-preventive institutions experienced an increase of 8-10 percent (1970-1975), which was approximately the same as the growth rate in other countries. In 1970 the number of analyses performed was 702.4 million, while in 1975 it was 1,290,700,000--that is, the total increment was 46.6 percent from 1970 to 1975. These data indicate a stable tendency toward expansion of both the absolute volume of laboratory information and its relative quantity per visit, per hospitalized patient, and so on (Table 1).

The figures in Table 1 doubtlessly reflect the growing role of laboratory information in the modern diagnostic process, in control over treatment of patients, and in the influence of measures implemented by the USSR Ministry of Public Health to develop the laboratory service.

Table 1. Indices of Laboratory Support to the Public for Different Years.

(1) Число анализов	1970	1971	1972	1973	1974	1975
(2) На 1 койку	136,4	143,9	150,0	150,3	161,1	175,5
(3) На 1 стационарного больного	7,0	7,4	7,8	7,9	8,4	9,2
(4) На 1 посещение	0,23	0,24	0,26	0,27	0,28	0,29

Key:

- |                       |                             |
|-----------------------|-----------------------------|
| 1. Number of analyses | 3. Per hospitalized patient |
| 2. Per bed            | 4. Per visit                |

What is especially important is that the increment in the quantity of analyses performed for outpatients (47.6 percent) was greater than that for analyses performed in hospitals (45.6 percent) in 1970-1975. In this case the proportion of hospital analyses decreased somewhat (from 49.7 percent in 1970 to 49.3 percent in 1975) in favor of analyses performed for patients by polyclinic-outpatient institutions (50.3 percent in 1970, and 50.7 percent in 1975). This trend should be interpreted as extremely positive, reflecting the growing use of laboratory analyses for early diagnosis of diseases and in prehospitalization examination of patients. Analyses performed for hospital patients and outpatients are distributed about equally with respect to their basic types into general clinical, hematological, cytological, and immunological analyses; meanwhile, the greater part of the biochemical and microbiological analyses are performed for hospitalized patients. The trend toward dominant increase in the quantity of some types of laboratory analyses is interesting. Thus during these years the percent increments were 101.9 for immunological analyses, 92.7 for biochemical analyses, and 62.3 for cytological analyses, while the increments were 49.4 for hematological, 27.7 for microbiological, and 27.8 for general clinical analyses. However, in addition to analyzing the increment in the number of analyses it is very important to examine the dynamics of the structure of these analyses, data on which are presented in Table 2 both in relation to the total volume of analyses and in relation to hospital and outpatient sectors.

As follows from these data predominant growth in the numbers of certain types of analyses does not always elicit significant changes in the structure of the analyses performed in laboratories. As an example the quantity of immunological analyses increased by 101.9 percent in 1970-1975, while their proportion in 1975 was only 9.9 percent of all analyses made (7.2 percent in 1970). While the absolute number of general clinical analyses increased by only 27.8 percent, their proportion remained predominant (44.8 percent in 1970 and 39.0 percent in 1975).

Important significance in diagnosis is attached to biochemical analytical methods, which promote fuller establishment of the diagnosis, better

Table 2. Distribution of Analyses (Percent) in Relation to Date Made of Analyses in Different

(1) Исследования	(2) Удельный вес от числа анализов, выполненных																	
	(3) Для стационарных и амбулаторных контингентов						(4) Только для стационарных контингентов						(5) Только для амбулаторно-поликлинических контингентов					
	1970	1971	1972	1973	1974	1975	1970	1971	1972	1973	1974	1975	1970	1971	1972	1973	1974	1975
(6) Общеклинические	44,8	43,6	42,0	39,6	41,2	39,0	40,4	40,5	37,1	32,6	35,4	32,0	49,2	46,6	46,9	46,2	46,6	45,9
(7) Гематологические	30,8	31,0	30,1	30,1	28,9	31,4	28,9	28,5	27,8	28,3	27,0	31,9	32,7	33,6	32,2	31,8	30,7	30,9
(8) Цитологические	1,4	1,7	1,6	1,7	1,5	1,6	1,4	1,4	1,5	1,4	1,3	1,3	1,4	2,0	1,6	1,9	1,7	1,8
(9) Биохимические	9,7	10,3	10,8	13,3	12,6	12,8	14,0	14,6	15,3	19,8	18,1	17,9	5,5	6,1	6,6	7,1	7,5	7,8
(10) Микробиологические	6,1	6,1	6,6	6,1	5,8	5,3	8,0	8,1	9,3	8,6	8,4	7,4	4,1	4,0	4,0	3,8	3,4	3,3
(11) Иммунологические	7,2	7,3	8,9	9,2	10,0	9,9	7,3	6,9	9,0	9,3	9,8	9,5	7,1	7,7	8,7	9,2	10,1	10,3
(12) Всего . . .	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

- Key:
- Analyses
  - Proportion in relation to the number of analyses made:
  - For hospitalized patients and outpatients
  - Only for hospitalized patients
  - Only for the polyclinic-outpatient group
  - General clinical
  - Hematological
  - Cytological
  - Biochemical
  - Microbiological
  - Immunological
  - Total



selection of therapeutic measures, and better control over therapy. In the period under examination the proportion of biochemical analysis experienced regular growth: Thus it was 9.7 percent of the total quantity of analyses made in 1970 and 12.8 percent in 1975; the respective figures were 14.0 and 17.9 percent for hospitalized patients and 5.4 and 7.8 percent for patients of polyclinic-outpatient institutions. The greatest increment among types of biochemical analyses was noted in the group containing new, progressive types (determination of enzymes and hormones, water-salt metabolism indices, and so on), which reflects scientific-technical progress and the new demands of therapy in specialized institutions. In the period from 1970 to 1974 the increments were 138.0 percent for water-salt metabolism analyses, 122.8 percent for enzyme analyses, 89.5 percent for coagulation analyses, and 29.2 percent for hormone analyses. The proportion of these analyses with respect to the total number of biochemical analyses was 5.3 percent in 1970 and 16.7 percent in 1974 for coagulation analyses; these figures were 6.1 and 7.8 percent respectively for enzyme activity analyses, and 3.4 and 4.7 percent respectively for water-salt metabolism analyses.

The reason that the proportion of the latest, most promising biochemical analytical methods is still low is that the capabilities of laboratory technical equipment are still inadequate, the supply of appropriate reagents is low, and so on. In particular, the proportion of hormone analyses was only 0.8 percent in 1970 and 0.6 percent in 1974.

We cannot fail to note significant fluctuations behind these averaged data in the indices characterizing the activity of laboratories in individual union republics. Thus the average number of analyses per visit in 1975 was 0.43 in the Estonian SSR, 0.41 in the Moldavian SSR, 0.15 in the Armenian SSR, and 0.13 in the Azerbaydzhan SSR, the union average being 0.29.

In addition to acquiring average data, which reveal the trends that have taken shape in most of the clinical diagnostic laboratories, we were considerably interested in analyzing the results of the activities of the leading institutions, since development of the laboratory service in the future could be predicted on the basis of these results. Thus the number of analyses per visit in 1972 in the Estonian SSR (0.38) and the Moldavian SSR (0.35) became an example to be followed by the laboratory services of other union republics: In 1975 this index was 0.29 for the RSFSR (0.26 in 1972) and 0.33 for the Ukrainian SSR (0.30 in 1972).

Let us cite the indices describing the activities of laboratories belonging to some therapeutic-preventive institutions, relying upon data from local operational reports.

Thus the laboratories of Clinic No 1 of the Moscow Medical Institute imeni I. M. Sechenov are making a significant number of analyses (894,500 in 1972, and 1,669,983 in 1975)\*; the increment in relation to the preceding year

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\*A centralized clinical diagnostic laboratory outfitted with a number of automated instruments has been functioning in the institute since 1974.

was 10.6 percent in 1972, 52.0 percent in 1974, and 33.0 percent in 1975. The average quantity of analyses per hospitalized patient also grew in parallel with growth in the total number of analyses: It was 27.5 in 1968, 33.0 in 1971, 36.0 in 1972, 46.0 in 1974, and 59.9 in 1975.

The trend toward a larger total number of analyses can be seen especially graphically in examples of individual clinics (Table 3).

Table 3. Number of Analogies Per Hospitalized Patient in Individual Clinics of Moscow Medical Institute No 1.

Клиника (1)		1968 г.	1972 г.	1975 г.
(2)	I терапевтическая	31,5	37,4	71,3
(3)	II терапевтическая	43,2	52,3	91,5
(4)	III терапевтическая	32,1	52,8	87,5
(5)	Урологическая	26,8	56,8	89,6
(6)	Глазных болезней	4,8	7,3	18,2
(7)	ЛОР	11,6	11,1	10,4
(8) Среднее . . .		27,5	35,2	59,9

Key:

- |                            |                          |
|----------------------------|--------------------------|
| 1. Clinic                  | 5. Urological            |
| 2. Therapeutic clinic No 1 | 6. Eye diseases          |
| 3. Therapeutic clinic No 2 | 7. Ear, nose, and throat |
| 4. Therapeutic clinic No 3 | 8. Average               |

The indices cited in Table 3 significantly exceed the union averages, which can be explained by the place this institution and its clinical base occupy within the system of the USSR Ministry of Public Health's therapeutic-preventive institutions as a major therapeutic-diagnostic and consultative center.

The trend toward specialization and narrow specialization of therapeutic work that has taken shape in recent years has especially affected therapeutic and surgical clinics; this has necessitated expansion of the range and enlargement of the quantity of analyses per hospitalized patient in departments of these specialties, as is illustrated by Table 3.

We should note that biochemical analyses and, among them, those pertaining to the newest divisions of laboratory diagnosis--determination of hormones and enzymes, and immunological analyses--contribute a significant proportion to the structure of analyses performed for patients at clinics of Moscow Medical Institute No 1. Thus the proportion of biochemical analyses with respect to the total quantity performed for hospitalized patients was 42.6 percent in 1972, 49.7 percent in 1974, and 44.9 percent in 1975, reaching

up to 54.0 percent at certain clinics (therapeutic) (the average union indices were 15.3 percent in 1972 and 18.1 percent in 1974).

In the biochemical analysis group, the proportion of the most complex analyses (determination of hormones, enzymes, and indices of water-salt metabolism and the hematocoagulation system) was more than 50 percent, to include 6-7 percent hormone analyses.

Statistics taken from the operational reports of V. Ye. Rubina, the senior laboratory specialist of the Ukrainian SSR Ministry of Public Health, particularly the reports of the Voroshilovgradskaya Oblast Clinical Hospital (senior physician--A. V. Antimonov, oblast senior laboratory specialist--G. Ye. Zhutayev) could serve as an example for the activities of oblast clinical diagnostic laboratories. These reports present indices characterizing laboratory support to therapeutic-preventive institutions at different levels of medical assistance to the public. Thus the average annual increment in the quantity of analyses performed at the oblast hospital in 1971-1975 was 6.1 percent, while the number of analyses per hospitalized patient was 16.8 (1971) and 19.1 (1975). In 1971 this index was, correspondingly for city, central rayon, and oblast section hospitals, 10.8, 11.2, and 6.8 analyses per hospitalized patient. We should emphasize that the number of analyses per patient in specialized departments of the oblast hospital was significantly greater than the hospital average (16.8): 19.9 in the urological department, 20.8 in the cardiorheumatological department, 22.0 in the gastroenterological department, 27.2 in the revivification department, 30.2 in the hematological department, and 47.3 in the nephrological department.

The average number of analyses per visit to specialized offices of the oblast hospital's polyclinic also significantly exceeded the average indices, being 0.9 for the cardiorheumatological office, 1.7 for the gastroenterological office, and 3.7 for the hematological office (the average for the polyclinic was 0.4 analyses per visit). The number of analyses per visit was, respectively for central rayon and section hospitals of Voroshilovgradskaya Oblast, 0.4, 0.3, and 0.2. The proportion of biochemical analyses within the total quantity of analyses made by the oblast hospital grew from 39.2 percent in 1971 to 48.7 percent in 1975, the figures being 13.8 percent for city hospitals, 16.1 percent for central rayon hospitals, and 1.0 percent for section hospitals.

The stable trend toward larger numbers of biochemical and, to a certain extent, immunological analyses, typical of the laboratories at the leading therapeutic-preventive institutions, reflects the most promising directions of laboratory diagnosis and saddles the laboratory service with the task of making broader use of these progressive types of analyses in laboratory support to the therapeutic-diagnostic process (personnel training, appropriate outfitting of laboratories, and so on).

The requirements imposed on the laboratory service at the present stage of development in public health produce a need for broader and deeper information

on the activity of clinical diagnostic laboratories for the purposes of maintaining control, training personnel, and supplying equipment and reagents.

The local reporting situation itself requires review and elaboration of some premises so that a more informative way to assess the activities of clinical diagnostic laboratories could be developed. First we need to find a precise definition for the "analysis" concept as a unit of statistical accounting, specify the quantitative assessments given to so-called general analyses of blood and urine, and so on.

Quantitative accounting is presently based on the "List of Basic Types of Laboratory Analyses" approved by Order No 851 of the USSR Ministry of Public Health dated 1970, which includes about 350 names. This list has played a certain organizational role, placing order into the statistical information. This has made it possible to unify not only the quantitative assessments of the activities of clinical diagnostic laboratories but also the qualitative descriptions (distribution of analyses with respect to basic types, grouping of individual analyses, and so on). However, this list no longer embraces the entire diversity of laboratory analyses and requires review in accordance with the draft international classification of laboratory procedures proposed by the World Health Organization, which contains the names of more than 500 such procedures.

A differentiated approach is not always taken to analyzing statistics on laboratory activities when averages are derived for the activities of therapeutic-preventive institutions. Thus the counts of analyses per hospitalized patient, per bed, and per visit often include so-called auxiliary analyses performed for the purposes of quality control, procedural improvement, plotting of calibration curves, and so on, but at the same time they do not include analyses made by nonlaboratory personnel as well as by bacteriological laboratories at epidemiological stations in support of the therapeutic-diagnostic process. A differential approach accounting for the laboriousness of analysis is also needed if we are to assess the work load of laboratory colleagues. This pertains to qualitative and quantitative analyses, quick tests, reactive strips, manual work, work with mechanized and automated resources, and so on.

Laboratory service accounting cannot be improved without extensive participation by the workers of practical public health institutions. This analysis shows that the laboratory service is developing at the present stage in correspondence with the requirements of the science and practice of public health. In order that the noted trends could be manifested fully and that the arising problems could be solved promptly, we must continually make objective assessments of the work results of the laboratories, which would be made easier by improvements in the accounting forms and methods.

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ETIOLOGY OF OCCUPATIONAL ALLERGIC RHINITIS RELATED TO PREMANUFACTURE  
TOBACCO PROCESSING AND GROWING

Moscow VESTNIK OTORINOLARINGOLOGII in Russian No 5, 1977 pp 92-94

Article by R. K. Tulebayev, candidate of medical sciences, and U. Lutfullayev, Scientific Research Institute of Regional Pathology (Prof B. A. Atchabarov, corresponding member of the Kazakh Academy of Sciences, director), Alma-Ata, submitted 7 Feb 77]

[Text] There are several reports in the Soviet and foreign literature of the allergenic effect of tobacco under industrial conditions (I. Ye. Andreychuk, 1959; A. Ye. Vermle', 1964; R. K. Tulebayev, 1971; R. K. Tulebayev and V. S. Moshkevich, 1975; Franchi, 1937; Barksdale, 1940; Chladek, 1947; Cooke, 1947; Harcany, 1964, and others). At the same time, there has not been sufficient investigation of possible development of allergic pathology of the upper respiratory tract among kolkhoz tobacco growers, as related to premanufacture processing of tobacco and possible development of sensitization among kolkhoz workers at tobacco plantations. The distinctions of inspiratory intake of a set of chemicals, continuously present in the breathing range of tobacco growers, as well as the above-mentioned literature data concerning the allergenic effect of tobacco under production conditions, prompted us to conduct a clinical allergological survey of the condition of the upper respiratory tract of 528 kolkhoz farmers working in a tobacco growing kolkhoz. All of these farmers were engaged in premanufacture processing of tobacco. For the sake of comparison, we conducted an analogous survey in a control group (72 people). These individuals live 2 km away from the tobacco growing kolkhoz and their jobs do not involve contact with chemicals. The control group consisted primarily of women under 40 years of age, which corresponded to the age range in the main group.

The kolkhoz workers of the main group complained of bouts of sneezing, rhinorrhea, itching in the region of the nose and eyes, hoarseness, irritability and migraine attacks. We were impressed by the numerous complaints, presented by 87.5% of the individuals in the main group and 25% in the control group ( $P < 0.001$ ). When examining the upper respiratory tract, we paid particular attention to the nature of changes in the nasal mucosa. In some cases, it was anemic, with areas of cyanosis or hyperemia; in others, it was markedly hyperemic and edematous. In 23% of the cases, there were

mucous secretions in the nasal cavity. "On the job hyperemia" of the nasal mucosa developed in 18.5% of the kolkhoz farmers who presented no signs of vasomotor rhinitis (B. S. Preobrazhesnkiy et al., 1969), and it disappeared when they were off work. Pathology of the upper respiratory tract was found in 90.5% of the kolkhoz farmers involved with premanufacture processing of tobacco. We found chronic pathological changes in the nasal mucosa in 74% of those examined and vasomotor rhinitis in 33%.

In view of the fact that impairment of physiological functions of the nasal mucosa, and particularly a change in its pH, is a predisposing factor in the development of allergic disease, we used this test on 296 kolkhoz workers, including 90 with allergic rhinitis and 83 with vasomotor rhinitis. All these patients presented a statistically reliable change in concentration of hydrogen ions in the direction of alkalinity ( $8.5 \pm 0.04$ ). Consequently, this combination may be evaluated as one of the set of symptoms of sensitization, while the alkalosis symptom should be considered an additional test in diagnosing vasomotor and allergic rhinitis.

We made an allergological survey, including examination of smear impressions, of 150 individuals with allergic (90 people) and vasomotor (60) rhinitis and analyzed the results of endonasal provocation tests on 78 patients. For the sake of comparison of the obtained results, we submitted 50 healthy individuals in a control group to an identical examination.

In addition to the above-mentioned objectives, we tried to demonstrate the possible allergen in the set of chemicals in the breathing zone of the tobacco growers. For this purpose, we prepared a special allergen of tobacco dust and tobacco leaves (separately) using the method developed by S. M. Titova (1963). In addition, to check the possible allergization of the organism by hexochloran and Bordeaux mixture, we prepared solutions (1:1000) of these substances.

Eosinophils (in small number or covering the entire field) were demonstrable in all patients with allergic and vasomotor rhinitis. A difference in eosinophils on impression preparations in patients referable to these two nosological forms was demonstrable only with regard to percentile ratio between the demonstrated elements. Significant eosinophilia (+++) was demonstrated in 28% of the cases of allergic rhinitis and 6% of those with vasomotor rhinitis. In 20% of the cases of allergic rhinitis and 11% of those of vasomotor rhinitis, eosinophilia was not encountered in all fields (++) . Isolated cells were demonstrated in 22% of the patients with allergic rhinitis, 19% of the cases of vasomotor rhinitis and 7% of the individuals in the control group.

According to the literature (B. S. Preobrazhenskiy et al., 1969), the presence of isolated eosinophils in the field is not a confirmation of allergic disease. However, in our opinion, the high percentage of mildly positive tests in the group of patients with these forms of disease is indicative of sensitization of the organism.

The endonasal provocation test was evaluated as positive in the case of appearance of signs of a congested nose, rhinorrhea, sneezing, erythema and

itching of the eyelids. With eruption of urticaria on the face or onset of asthmoid respiration, the test was evaluated as severely positive. A positive endonasal test was demonstrated in 52 out of the 78 tobacco growers examined, i.e., 66.6%.

The rhinocytological findings in cases of allergic rhinitis were characterized by the following changes: up to 25-30% epithelial cells and appearance of goblet cells. As compared to the initial cytograms, the amount of eosinophils increased to 5-6%, and eosinophilic leukocytes appeared in all 48 patients with allergic rhinitis and 28 of those with vasomotor rhinitis. Mast cells (up to 2%) appeared in 12 of the cases of allergic rhinitis. The endonasal tests with hexochloran and Bordeaux mixture were negative in the cases of allergic rhinitis. The healthy individuals in the control group elicited negative results in the tests with tobacco dust and leaves.

Thus, on the basis of our clinical and experimental studies, we arrived at the conclusion that tobacco, prior to processing in a factor, is an allergen that sensitizes the organism and elicits an allergic reaction in the "impact" organ, i.e., the nasal cavity.

#### Conclusions

1. Kolkhoz farmers working at tobacco plantations are subject to the combined effect of a number of deleterious factors, the chief ones being irritating chemicals. The kolkhoz farmers develop pathological changes in the upper respiratory tract under the influence of these agents.
2. Functional testing of the mucosa of the upper respiratory tract revealed alkalosis ( $8.5 \pm 0.04$ ) of the nasal mucus.
3. We used a comprehensive allergological method of examination, including a rhinocytological test and endonasal provocation test, to determine the etiological factor of development of occupational allergic disease of the upper respiratory tract among kolkhoz farmers employed at tobacco plantations. A comparison of the obtained data revealed that allergic pathology of the upper respiratory tract was present in 33% of the cases.

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CYTOLOGICAL AND HISTOLOGICAL TESTS IN DIAGNOSTICS OF ALLERGIC RHINOPATHY OF CHEMICAL ETIOLOGY

Moscow VESTNIK OTORINOLARINGOLOGII in Russian No 5, 1977 pp 95-99

[Article by G. G. Kruglikov, V. B. Pankova and V. D. Arutyunov, Department of Occupational Pathology of the Ear, Nose and Throat (head: Prof. V. Ye. Ostapkovich); Laboratory of Pathomorphology (head: Prof V. D. Arutyunov), Institute of Industrial Hygiene and Occupational Diseases (director: N. F. Izmerov, doctor of medical sciences), USSR Academy of Medical Sciences, Moscow, submitted 8 Feb 77]

[Text] The intensive development of the chemical industry is leading to a higher incidence of allergic pathology of the upper respiratory tract among workers at chemical enterprises (L. B. Daynyak, 1966; V. Ye. Ostapkovich and O. V. Kudinova, 1974; V. B. Pankova, 1976; I. B. Soldatov et al., 1976; Van Dischoeck, 1967; Krivanek and Pecves, 1972; Sowinski and Golusinski, 1972). Special investigations deal with various aspects of the effects of industrial chemical allergens on the respiratory tract (R. K. Tulebayev and V. S. Moshkevich, 1975; V. I. Rodin and S. S. Kiskachi, 1975; V. Ye. Ostapkovich et al., 1976; Schwarz, 1969; Cichocki et al., 1970; Wahlberg and Skog, 1971). At the same time, in view of the absence of specific clinical signs of occupational rhinopathy, additional objective tests are constantly used for more precise diagnostics, including endonasal administration of chemical allergen as a provocation test that induces immediate increase in local sensitivity.

Our objective included investigation of morphological processes in the nasal mucosa, which develop among workers who are in constant contact with chemical allergens in the course of their work (formaldehyde, chromium, rosin [colophony], nickel, synthetic vitamins: nicotinic acid, riboflavin, pyridoxine; synthetic antibiotics, etc.), analysis of the cytological compositions of impressions of the nasal mucosa presenting clinical signs of allergic rhinitis among workers in the chemical industry, after conducting the endonasal provocation test with the above-mentioned allergens, as well as evaluation of similarity of morphological substrates reacting to the chemicals.

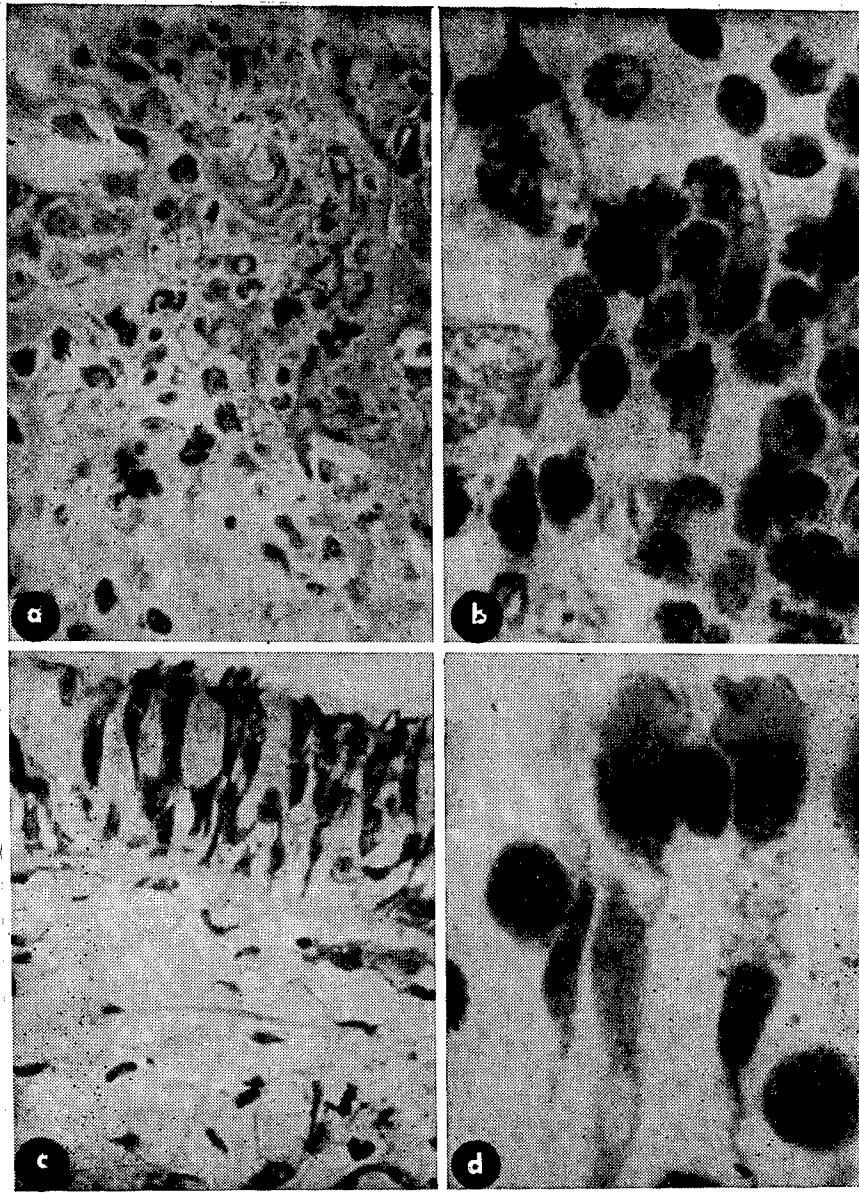


Figure 1. Morphology of allergic inflammation of the nasal mucosa..  
Azure-2-eosin stain.

- a) eosinophil infiltration of the mucosa, discharge of eosinophil leukocytes (dark granular cells) on its surface; magnification 400×
- b) accumulation of eosinophil leukocytes in a mucosal impression; magnification 900×
- c) reorganization of ciliated cells into goblet cells; magnification 400×
- d) group of goblet cells in mucosal impression; magnification 900×

We made a histological and histochemical examination of part of the mucosa of the inferior and middle nasal conchae removed to improve nasal respiration. The material was fixed in 10%

formalin and imbedded in paraffin. The sections, 7  $\mu$ m in thickness, were stained with azure-2-eosin, picrofuchsin by the Van Geison method for demonstration of collagen fibers; toluidine blue, at pH of 0.5, 5.9-6.0, for demonstration of mucopolysaccharides; the Mallory method was used for demonstration of fibrin, and gallocyanin-chromium alum, pH 1.6, by the methods described by Pearse (1962), was used to assay nucleic acids.

Impression smears of the nasal conchal mucosa were obtained from 75 patients by inserting polished slides, 5x60 mm in size, into the nose. The obtained impressions were fixed in methyl alcohol and stained with azure-2-eosin, as well as toluidine blue. The initial rhinocytograms were examined 5 and 20 min, as well as 1, 2, 4, 24 and 48 h after the tests with the particular allergens that the workers were exposed to at work. Impressions obtained from the same individuals, but after administration of saline (1st control), as well as impression preparations from healthy individuals, obtained after administration of the chemicals under study (2d control) served as the controls. Upon microscopic examination of the impression preparations (magnification of 1350x), we counted the cellular elements on the basis of 500 cells and their mean number was expressed as a percentage.

Examination of the preparations, i.e., sections of the mucosa of the middle and inferior nasal conchae, revealed allergic inflammatory reactions. The blood vessels were dilated in the nasal mucosa, and their lumen showed marginal localization of granular and agranular leukocytes, as well as intensive passage thereof through the wall of the vessels. The lamina ["substance"] propria presented areas with intensive  $\gamma$ -metachromasia (toluidine blue stain), i.e., we demonstrated unbound acid mucopolysaccharides. Among the leukocytes that had been discharged into tissue, there was prevalence of eosinophils arranged in large collections. Eosinophilic leukocytes were demonstrable throughout the thickness of the mucosa and we could readily observe their passage through the cells of the multicolumnar ciliated epithelium to the surface as part of the secretions and, in the case of desquamation of the epithelium, through the free basement membrane (Figure 1a).

Along with eosinophilic leukocytes, the tissues revealed neutrophil leukocytes, as well as lymphoid, plasma and mast cells, serotoninocytes, macrophages with phagocytized material in the cytoplasm. The cytoplasm of plasma cells revealed an intensive RNA reaction (gallocyaninophilia) and marked basophilia when stained with azure-2-eosin (signs of intensive protein secretion). The mast cells were localized mainly in the deep layers of the mucosa (supraglandular zone) near the vessels and cavernous bodies. In these same areas, we found individual serotoninocytes, which were the largest cells with large orthochromatic granules in the cytoplasm (Figure 2a). All of the granular cells (eosinophils, mast cells and serotoninocytes) were frequently found to be in a state of degranulation, enriching tissues with biogenous amines. In the deep layers of the lamina propria there were many protein-mucus glands,

with an accumulation of secretions in their terminal segments and excretory ducts. There was a significant difference in cell composition and thickness of the multicolumnar ciliate epithelium lining the mucosa in different areas. Not uncommonly, there were zones of thickened epithelium and, occasionally, on the contrary, we observed marked thinning of the epithelium with a change into single-layered, and even denudation of the basement membrane. Processes of change into goblet cells were observed in a significant number of the ciliate cells. The transforming cells increased in size; there was accumulation of metachromatically stained secretions in the cytoplasm and gradual loss of cilia. There was prevalence of goblet cells in the areas of such transformation (see Figure 1c). Mitoses were rare among the epithelial cells. In some cases, a lengthy course of inflammation evolved into sclerosis of the mucous membrane.

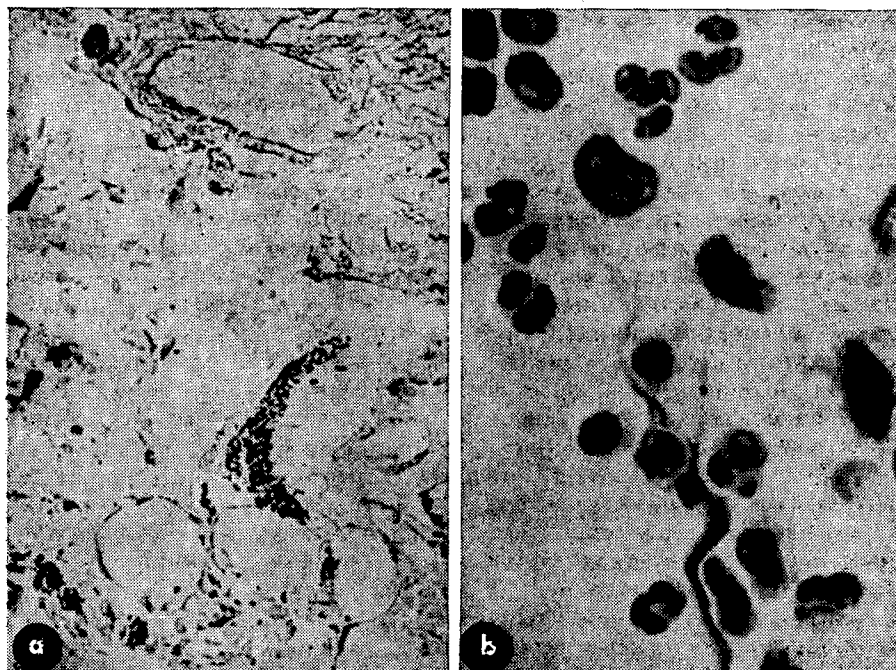


Figure 2. Cell forms in a site of allergic inflammation in the nasal mucosa. Azure-2-eosin stain.

- a) mast cells, serotoninocyte in the mucosa; magnification 400×
- b) group of macrophages with metachromatic substance in the cytoplasm among neutrophil leukocytes in an impression preparation of the mucosa; magnification 900×

Analysis of impression preparations of the nasal mucosa, obtained from workers sensitized with the above-mentioned allergens and in a state of remission, shows that their cytological composition, examined between 20 min and 1 h after endonasal administration of the allergen, reflects the

allergic process in tissue to a maximum degree. Since eosinophilic leukocytes are the main test cells characterizing development of an allergic inflammatory reaction of the immediate type, they were the first to be studied in impression preparations. At the early stage of the reaction (up to 1 h) to endonasal administration of the chemical allergen, we found a significant number of eosinophilic leukocytes, 4-5 times more than the initial content. These cells were arranged in small (3-8 per field) and occasionally numerous groups, which filled entire fields (see Figure 1b). Along with mature cells, we encountered juvenile ones, as well as disintegrated forms with diffuse granules. Another cell that is inherent in allergic processes is the mast cell, but it was encountered extremely rarely in impression preparations obtained from those suffering from "chemical" rhinopathy. We often observed macrophages with metachromatic diffuse or clumped substances varying in caliber, in the cytoplasm, and they resembled the mast cells (see Figure 2b). Unlike the mast cells, macrophages with metachromatic substances were not demonstrable with toluidine blue stain at low pH (0.5), i.e., they did not contain highly sulfated mucopolysaccharides of the heparin type. In addition to the above-described cells, macrophages with phagocytized material were not infrequently seen in the cytoplasm. Phagocytic macrophages were observed particularly often with administration of allergens containing suspended and poorly soluble particles (riboflavin). All forms of ciliate epithelium were demonstrable in the impression preparations: ciliated, intercalary, goblet, as well as isolated cells of squamous epithelium, apparently from the areas of metaplasia. In addition there were a significant number of cells of dedifferentiated epithelium of oval or branched [with processes] form, with large clear nuclei and one or two large nucleoli, and diffuse or clumped metachromatically stained substance in the cytoplasm. In addition to typical ciliated cells with cilia along the apical margin, there was a significant amount of cells that stored metachromatically stained foamy secretions in their cytoplasm and gradually lost their cilia, i.e., they became transformed into goblet cells that secreted intensively (see Figure 1d). All these cell forms were observed against the background of a large number of neutrophil leukocytes, occasionally presenting destructive signs (karyolysis, lack of clearly circumscribed cytoplasm and pyknosis).

A study of the cytological composition of the secretions of the nasal mucosa in the same group of sensitized workers after the test with saline (1st control) or endonasal administration of the tested chemical allergens to healthy individuals (2d control) revealed that none of the above-described features was present in impression preparations. In control preparations, among neutrophil leukocytes there were some epithelial cells, as well as isolated eosinophils and macrophages, demonstrable in 50% of those examined.

Thus, the above-described features observed on impression preparations from the nasal cavity after endonasal testing constitute an objective reflection of allergic inflammation, which develops in the lamina propria of the first levels of the upper respiratory tract of workers sensitized with the same chemical allergens. The demonstrated morphological identity of

the process under study in impressions and tissue warrants the recommendation of impression preparations as an additional objective criterion, along with the clinical tests used to diagnose "chemical" rhinopathy.

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