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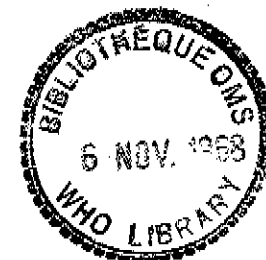
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POSITIVE AND NEGATIVE SIDES OF MASS SCREENING
FOR DETECTION AND DIAGNOSIS

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I. Importance of mass screening

Our present knowledge with regard to the etiology and pathogenesis of several types of malignant tumours gives us many possibilities, not only of preventing some of these tumours but also of organizing a complex cancer control measuring system. In this system, a great part should be devoted to the organization of early detection which should be arranged to cover the different sites, commencing with the most common. The difference in geographic distribution of malignant tumours gives a priority in each region to the most common site and some of them become an international problem, for example, lung, colon and rectum cancer in the United States of America, stomach cancer in Japan and the USSR, oropharyngeal cancer in India, bladder tumours in the UAR, etc.

Mortality and morbidity statistics demonstrate that changes in age-groups, prolongation of life in large communities, the decrease in incidence of many infectious diseases, have brought cancer to the forefront in many countries and it is clear that only combined efforts can solve the problem. The differences in the systems of medical care, medical education of the physician especially in the field of cancer, and the degrees of knowledge of the general public about the possibility of early detection have made it very difficult to develop standard methods for the organization of early detection programmes. However, in the last two decades, many countries have independently started national and local programmes of mass screening as an important measure for early detection and prevention of cancer. With regard to prevention, the main point was to detect and actively treat the precancerous conditions.

Now, after much data has been collected on mass screening in several countries, it is possible to analyse the positive and negative sides of mass screening campaigns especially those devoted to early detection.

Many questions arise when we make these analyses, and first of all it is necessary to answer what we really expect from mass screening since this method has its own limitations. It is difficult to expect that at the time of the mass screening campaigns it would be possible to detect all cases of cancer, since the methods and tests presently in use have their own limitations.

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There are several aspects of this problem that can be discussed:

- (a) Economical: the cost of mass screening campaigns, for example of screening one person for cancer or precancer.
- (b) Allocation of working time of the physician and auxiliary personnel for mass screening.
- (c) Present limitation of possibilities of detection of several sites of cancer through mass screening.
- (d) The most practical methods and tests to be used in mass screening campaigns.
- (e) The present effectiveness of mass screening and its possible increase in the future.

For a long time there has been a philosophy that the first step in early diagnosis should be taken by the patient and that the best method was public education and self-examination. However, the last decades demonstrated that the first step of diagnosis should be taken by the physician, and this included first of all the mass examination of people without symptoms of disease and of those people with some symptoms who did not take them seriously or did not suspect cancer or precancer, thereby delaying their visit to the doctor. It is more correct to say that there should be no distinction between these two and it is necessary to develop both of them in the framework of the cancer control programme.

One of the approaches for a mass screening campaign is to ask why in several cases we see the patients are already in advanced stages. In the USSR it is obligatory to fill in a special form for each advanced stage and make analyses as to why this has happened. We studied 746 forms and saw that 28.3 per cent. were as a result of physicians' mistakes in diagnosis or tactics, 8.7 per cent. of cases involved hidden forms of cancer, in 27.1 per cent. of the cases these were due to the impossibility of treating them because of age or the presence of other diseases; and in 35.9 per cent. it was due to the physician not being informed by the patient of early symptoms and the patient's reluctance to undergo treatment. The last group is the most common in the cause of advanced stages of cancer. For example, this group accounts for 58.8 per cent. of advanced stages of breast cancer, 53 per cent. advanced stages of cancer of the rectum, and 41.7 per cent. advanced stages of cancer of the stomach. This analysis brings us again to the conclusion that the performance of mass screening programmes could be one way of leading to a real improvement in health.

A well-known Russian gynaecologist, V. F. Snegirev, dreamed in the early twentieth century of providing mass screening for prophylactic examinations of women with a view to the early diagnosis of cancer. "If only we could persuade women of 30-50 years of age", he said "to undergo an examination every three or four months in the year, we could be sure that there would be no neglected forms of cancer, operations would be of the greatest effectiveness and relapses would become a rarity".

This dream has now come true. The purposes of medical examinations for men and women are now considerably wider and they are contributing not only to early diagnosis, but also to the prevention of cancer.

The opening of oncological sections ("kabinety") in polyclinics, of which there are more than 2000, and of cancer control centres ("dispensary"), 236, and the establishment of oncological institutes, 16, and hospital centres for conducting cancer control, have created all the prerequisites for the organization of mass screening on a countrywide scale. To achieve this it was essential to organize the work of oncologists along the lines of continuous observation, treatment and follow-up ("dispanserizacija").

The cancer control centre is closely linked both with the general network of medical establishments and with public organizations, factories and offices. This makes it possible for the centre to carry out general measures to improve health among the whole community, not merely confining itself to early detection and individual prophylaxis of malignant tumours. We have in mind the elimination of all occupational risks and the establishment of working and living conditions that would help to reduce morbidity from pretumoral diseases and would consequently be an effective way of preventing malignant tumours, of detecting all cases of malignant tumours and precancerous conditions, and of reducing the mortality of cancer. In this respect, special attention is given to the mass screening programmes.

2. Principles of mass screening

The features of mass screening prophylactic medical examinations of the population, an efficacious method of early detection of malignant tumours, will now be described.

Between 1946 and 1968, millions of Soviet citizens aged 30-35 years and over were given examinations. These large-scale examinations have been aimed not only at detecting persons suffering from pretumoral disease, but also at diagnosing cancer early and acquainting the public in more detail with its early signs.

An absolute majority of persons examined, were examined twice a year. In the process, an average of 0.15 per cent. of persons were found to be suffering from malignant neoplasms, 0.9 per cent. were suffering from pretumoral disease and in 0.2 per cent. of cases, there was a suspicion of malignant tumour. In this latter group subsequent investigation did reveal malignant tumours in a number of cases. The mass screening also led to the detection of non-tumoral diseases.

Mass screening programmes are of special importance not only for the early detection but also for assessing the conditions under which a number of pathological processes arise. They therefore help us to eliminate various harmful factors and in particular to bring to light occupational hazards.

The basic methods of carrying out mass screening are as follows:

- (1) Complex examination of organized groups of the population.
- (2) Complex examination of unorganized non-working groups.
- (3) Prophylactic examination of the population of a district by the district physician. A certain amount of his time is allocated for mass screening, and many general physicians have special schedules which include this type of work. They also examine perfectly healthy people.
- (4) Examination of persons who suffer chronically from diseases of the lung and gastro-intestinal tract. This examination is carried out by the district physician and a radiologist. In some polyclinics, there are special services for patients with chronic diseases of the lung and gastro-intestinal tract (pulmonological and gastro-enterological cabinets).
- (5) Examination of women by the gynaecologist, with special attention to early detection of uterine cancer. (It includes cytological mass screening.)
- (6) Examinations of organized and unorganized groups in polyclinics, out-patient clinics and women's advisory clinics (individual examination). In the last few years, special cabinets in polyclinics are organized for mass screening.

(7) Examinations carried out by feldschers and midwives, as the first to mass screening programmes in country areas.

The teams carrying out mass screening programmes have usually done so in the industrial enterprises themselves - in the factory, clinic, at the medical post or in the workshops. The team is allocated a medium-grade medical worker (nurse, midwife or feldscher) to give technical assistance and to deal with registration, although as a rule the factory trades union committee has allocated a member of the Red Cross Society specially to deal with registration of mass screening. The documents used in complex examinations are exactly the same as those used in other forms of oncological examination.

The role played by the chief specialist (surgeon, gynaecologist and therapist) in the organization of mass screening is very important. The proportion of cases in which complex examinations have been made more than once is high and among these the examination of women with the help of an obstetrician/gynaecologist has occupied a special place.

The chief specialists, together with the chief physician of the oblast or city cancer control centre, draw up a plan for the examination. The cancer control centre analyses the results obtained and sums them up with the help of the chief specialists, particular attention being paid to further investigation of patients in whom a malignant tumour is suspected.

A number of measures are usually taken before the beginning of every mass screening.

Several measures should be taken in preparation for mass screening and first of all the calculation of what groups should be screened. Demographic studies are needed on age and sex distribution, professional factors, the time-tables of working groups, etc. Special attention in each region should be given to geographic distribution of the main sites of cancer, and first of all to these sites. Only after this preparation can the general programme for mass screening be developed.

The general approach to screen women after 30 and men after 35 should not be a hard and fast rule. There are several areas in which mass screening should cover women after 25 and men not later than 30.

A plan for the mass screening is drawn up for each city, rayon, oblast, collective farm or machine-and-tractor station. In this plan the number of attendances is estimated and the form of examination is determined on the basis of the facilities available for carrying out mass screening.

When the plan is being drawn up, instructions are given for the district physician to examine this group as part of the early detection work in the polyclinic, special hours being set aside for the purpose and the persons concerned being notified through the district nurse and the active members of the Red Cross.

Some people are given examinations in their place of work. Consequently, if a complete coverage is achieved in the polyclinic by means of the individual examinations, both the organized and the unorganized parts of the population will be reached. If it is borne in mind that up to 60 per cent. of all those attending the polyclinic are seen by the district therapist, it will be obvious that he or she will be the leading figure in carrying out individual examinations. Since only few of the first attendances at the polyclinic were sent to hospital, it is more appropriate to arrange for individual examinations in the polyclinic, rather than in the hospital. This philosophy was the basis of opening special cabinets for mass screening in polyclinics.

Individual examinations are particularly important because among patients attending surgical sections in polyclinics, tests for pretumoral disease were made in 2 to 3 per cent. of cases; among those attending general clinics the figure is 4 to 5 per cent., and in gynaecological advisory clinics it reaches 8 to 10 per cent. The rate of detection of malignant tumours is therefore considerably higher in this case than during ordinary mass screening.

Among persons suffering chronically or often from gastric trouble, gastric cancer is detected between two-and-a-half and three times as often as during ordinary examinations, and yet the general advisory clinics have on their books a large group of persons suffering from various chronic diseases of the stomach and also of the lungs. It is therefore especially important for the district or workshop physician to pay special attention to the detection of patients with diseases of the lungs and gastro-intestinal tract and to keep special records of this group of patients in accordance with the principles of continuous observation, treatment and follow-up ("dispanserizacija").

In addition to the ordinary individual examinations carried out in out-patient clinics, polyclinics and hospitals, it was important, with a view to early detection of malignant tumours, to make use of the special examinations of particular groups of population for mass screening purposes:

- (1) the medical examination of industrial workers and the periodic issue of medical certificates at fixed times;
- (2) the supervision, treatment and follow-up of persons disabled in the Second World War;
- (3) the examination of other groups subject to supervision, treatment and follow-up by district physicians;
- (4) the selection of those needing treatment in spas, health resorts or in sanatoria;
- (5) the selection of persons needing special diets and physiotherapy;
- (6) the preliminary medical examination of persons beginning work in several factories;
- (7) the examination of blood donors.

It is possible to achieve good results in detecting malignant tumours and particularly pretumoral conditions during all these examinations and the number of people in these groups is enormous.

The preparation and conduct of mass screening consists of a number of measures which may be outlined as follows:

- (1) The drawing up of a combined plan for mass screening indicating the number of attendances expected, the place of examination, the work-load of the doctors, the duration of the examination, the direction of immediate treatment, etc.
- (2) The briefing of doctors in the oncological institute, the department of oncology, the cancer control centre and the urban or rural hospital. It is advisable that the briefing should be done by an oncologist with special attention to early detection possibilities for several localizations.
- (3) The briefing of nurses, feldschers and midwives taking part in the examinations.

- (4) The establishment of contacts with the management of the industrial enterprises concerned or with the active members of the Red Cross Society.
- (5) The giving of lectures to persons to be examined.

Possessing the necessary equipment, the examination team draws up a precise timetable and begins the examinations (not more than eight persons per hour). After the examinations have been carried out the team's task consists in analysing the recorded results, drawing up a report, and, what is most important, checking to see that all the cases of illness discovered have been sent to curative establishments, and that facilities are available to have them examined and treated early. Only when all those sent from the examinations have been examined or sent to hospital can the examination team's work be considered to be finished. According to experience gained, of the total number of cases detected at such examinations, 5.3 per cent. were sent to medical posts, 47.2 per cent. to polyclinics, 5.3 per cent. to hospitals and 42.2 per cent. to cancer control centres.

Over half of the cases detected are not sent to cancer control establishments. The bulk of these cases are persons suffering from erosion of the uterine cervix or from various forms of gastritis.

The oncological establishments summarize the general results of the examinations, study their effectiveness, and follow up the cases detected for examination at further stages. In the process it is not only the proportion of cured cases of malignant tumour that is determined, but also the results of the treatment of patients suffering from pretumoral diseases.

Experience of examinations in rural areas is still inadequate but the conditions do exist for carrying out prophylactic examinations with a view to the early diagnosis of malignant tumours, provided that use is made of the primary examinations of the rural population which decide whether they shall be placed under the supervision of the preventive, curative and follow-up services ("dispensary").

It is important to combine the examination carried out for the early diagnosis and prophylaxis of malignant tumours with other forms of examination. This makes it possible to use the examination as one of the stages in keeping the population under supervision by the out-patient, treatment and follow-up services. For early diagnosis and prophylaxis of malignant tumours it has proved particularly successful to combine the oncological examination with the examination of workers in dangerous trades, in the catering and food industries, etc.

As a result of the examinations we obtained data on morbidity from pretumoral diseases and determined the importance of those diseases in the tumoral process. Before the beginning of these examinations there was no registration of cases in this group - there was no out-patient treatment and follow-up system for them.

Examination of persons over 30 years of age working in the same industrial enterprises or offices and carried out regularly twice a year causes a rapid reduction in the number of new cases of malignant tumours registered. This reduction is particularly marked where all the workers are covered by regular examinations and persons with pretumoral diseases are given effective treatment.

An analysis of the available material makes it impossible for us to agree with the views of a number of scientists who think it necessary to examine only persons over 35 years of age. Cancer is most frequently encountered at the age of 45 or over. However, malignant tumours have been discovered in a significant proportion of persons even under 30 years of age. This underlines the necessity of examining women from the age of 25 years onwards and men from the age of 30. In the period 1947-1967 in the USSR 2.3 per cent. of those examined were aged under 20, 7.8 per cent. were aged 20-29, 31 per cent. were aged 30-39, 28 per cent. from 40-49, 17.1 per cent. from 50-59 and 3.8 per cent. over 60.

Among the organized population groups during that period it was mainly people under 50 years of age that were examined. However, malignant tumours were encountered frequently in higher age-groups. This leads to the conclusion that the examinations should be extended to cover unorganized groups of the population and workers in offices, co-operatives, small factories and other places, with a small number of workers, where hitherto such examinations have not been carried out.

The proportion of patients suffering from neglected tumours has fallen since the examinations were introduced.

Statistics show the importance of prophylactic examinations for early diagnosis, particularly since the radical treatment of these patients has proved highly effective.

3. Methods of mass screening

When we study the structure of the group of patients with precancer conditions diagnosed in mass screening campaigns, we see that 42.2 per cent. belong to the uterus; 33.3 per cent. to the stomach; 7.5 per cent. to the breast; 2.4 per cent. to skin; 2.3 per cent. to the rectum; 1.7 per cent. oropharyngeal; 0.8 per cent. oesophageal; and lung 0.6 per cent. In spite of important discussions taking place on the question of classification of precancer conditions in mass screening campaigns, the patients cannot wait until the discussions end. In chronic diseases they could be treated after detection by mass screening and this would already be a step towards prevention. Special examinations for this group is an active step towards early detection.

The possibility of mass X-ray examination of patients with symptoms of gastric disease is of decisive importance. Radiological examination of patients sent from prophylactic examinations led to the detection of malignant gastric tumours in 3.5 per cent. of cases, of gastric polyposis in 0.4 to 0.6 per cent. of cases, and of ulcers in 10 to 18 per cent. of cases. In the X-ray sections in oncological establishments these indices were somewhat higher. Gastric cancer was found in 6 to 18 per cent., polyposis in 0.3 to 0.7 per cent., and hypertrophic gastritis in 25 to 30 per cent. The importance of mass X-ray investigations has been indicated by many authors. It would be desirable to bring into general use combined fluorographic examination of the lungs, oesophagus and stomach. It is possible, if this method is used, to detect pathological changes in the stomach and to discover symptomless tumours in most of the cases where they are present.

It is clear that it is impossible to carry out mass X-ray screening on healthy people. In this respect, special attention should also be given to the high risk groups, and first of all to patients with chronic gastritis, gastric ulcers and other chronic gastric diseases. In areas where registration of stomach cancer shows a high incidence, for example in Japan and some areas of the USSR, there are proposals to do mass screening, including X-ray tests. The use of mass gastro-enterography with colour photography has some priority over mass X-ray, but again it is a question of what groups should be put under observation. This is again a matter for special discussion.

One of the extremely complex questions is that of the detection of stomach cancer in mass prophylactic surveys.

An analysis carried out by E. S. Skoblja in the Byelorussian SSR has shown that recourse to radiography is usually had only when patients complain of marked disturbances in the gastro-intestinal tract.

The Byelorussian Republican Oncological Prophylactic, Curative and Follow-up Centre ("Dispanser") carried out a trial survey of 101 000 persons living in town and country on the two-stage principle. The first stage was the filling-in of individual forms and the collection of case histories. As the second stage, mobile X-ray units carried out special examinations of people who had been shown to have disorders in the functioning of the gastro-intestinal tract.

As a result, 6.5 per cent., or 6585 persons, were subjected to large-film fluorography of the stomach. On the average each unit examined 30-40 persons a day. In the end 1817 radioscopic and radiographic examinations had to be made, since fluorography had revealed definite changes. Gastric cancer was diagnosed in 0.05 per cent. of the total number of persons examined in the first stage, while 83.8 per cent. of the cases found required radical treatment. This is an extremely high figure, and shows the undoubted efficacy of the programme, which is now being extended in the Byelorussian Republic.¹

Of decisive importance in the timely diagnosis of malignant tumours and pretumoral diseases of the stomach are the following examinations. Patients in curative establishments, analyses for sending to diet canteens, those in sanatoria for gastric patients, mass radiological and radiographic surveys of healthy persons in high-risk groups and careful treatment and follow-up of persons suffering from gastric disease with periodic check-ups at least every six months.

Success in the detection of malignant tumours of the rectum depends on the completeness with which the case history is taken, on compulsory rectal touch and on sending patients with a doubtful diagnosis for further examination, including proctoscopy. Of the total number in whom rectal cancer was suspected, the diagnosis was confirmed in 17 per cent. Prophylactic examinations have helped to reduce the proportion of neglected forms of malignant tumours. Of persons with pretumoral diseases of the rectum, 82 per cent. were sent to curative establishments.

Prophylactic examination of the population with a view to early diagnosis of lung cancer has shown the feasibility of detecting the development of that disease in its early stages. After the case history has been taken down and the patient examined, those in whom a lung tumour is suspected are sent for radioscopy, followed by radiotherapy. Among those in whom lung cancer was suspected, the diagnosis was confirmed in 36.3 per cent. of cases. Of the total number of lung cancer cases primarily registered in Leningrad, more than 10 per cent. were detected at mass screening.

At the present time there is more and more discussion of the trends in prophylactic fluorographic examinations. Thus, at the Congress of Prophylactic Medicine and Social Hygiene held in Sofia in 1966, T. Burilkov & L. Babadzhev² of Bulgaria reported on the results of over half a million examinations carried out in the Sofia district in the period 1956-1964, when 689 cases of pulmonary tuberculosis were found (13.8 per 10 000), 58 cases of lung cancer (1.16 per 10 000) and 114 cases of pneumoconiosis (2.29 per 10 000). They state that fluorography is being used more and more to detect lung cancer and the precursive changes.

¹ Skoblja, E. S. (1965) Methods of carrying out mass prophylactic examinations with a view to detecting cancer and pretumoral conditions of the stomach / Sovetsk. Zdravoohr., 8, 35-36.

² Burilkov, T. & Babadzhev, L. (1966) Mass radiographic examinations - yes or no? (A summary of papers read at the Eleventh International Congress of Prophylactic Medicine and Social Hygiene, Sofia, p. 78).

In the German Democratic Republic, mass prophylactic X-ray examinations are carried out. Up to 50 per cent. of all lung cancer patients are detected in this way, but unfortunately the analysis of case histories shows that most of the cases detected had already had a history of illness for over six months.

In mass screening programmes several techniques could be used, especially in the female genital tract. In cytology the main purpose is to obtain cytological specimens. This is done by physicians, auxiliary personnel or sometimes by the women themselves. The specimens should be sent as soon as possible to the cytological centre and here again important discussions are taking place as to who should be responsible for checking: physicians, technicians, pathologically educated or laboratory educated personnel. From our experience, it is much more important to have in cytology personnel with a background in pathology. In the first stage, with a large number of specimens, the auxiliary personnel could extract those cases with abnormalities. The mechanism of this process is under development and we believe that some progress will be achieved.

The development of cytological methods of diagnosis has sharply improved the effectiveness of mass prophylactic examinations. Thus, in the Hungarian People's Republic, 10 cytodagnostic centres began operations in 1960, and by 1965 a further four had been opened. The centres paid special attention to the development of cytological methods of diagnosing diseases of the lungs and stomach.

Dobrossy¹ states that 75 per cent. of the material came from oncological establishments and 25 per cent. from elsewhere. In 1964 alone the centres examined material from 32 000 persons, and with the help of the cytological method detected 322 cases of malignant tumours. With an annual figure of up to one million prophylactic examinations in Hungary, the cytological method has considerably increased the possibility of early detection of a number of forms of malignant tumour.

Colposcopic examinations were also proposed by several specialists as a method for a mass screening programme. In practice, there are not many studies which have proved this method for broad use. However, it is very important in the establishment of the diagnosis. For detection of breast lesions, self-examination was recommended and some studies have already been made to prove its importance, but self-examination alone could not be sufficient and in all consultations between physicians and patients - no matter what the diagnosis or symptoms - a breast examination should be obligatory. This should also be included in examinations by gynaecologists. In mass fluorography and X-ray screening programmes, the radiologists could also carry out examinations of the patients' breasts.

With regard to the urinary tract, cytological examination of urine could be of primary importance in mass screening in areas with high incidence of schistosomiasis, for example in the UAR where chronic diseases of the bladder, especially cancer, are common. So it could be wrong to say that cytological urine examination is of little practical importance.

In regard to the prostatic gland, the cytological screening of the material obtained by transrectal aspiration could be useful for examination of groups of old people, especially those over 60 years. In the last few years, cancer of the prostate has increased and we should try to find ways for mass screening with a view to the early detection of this localization.

Cytological methods in the respiratory tract are used but are not in broad application. X-ray tests and mass fluorography are the main methods used and we give below some results obtained by mass fluorography, which show the importance of this screening method.

¹ Dobrossy, L. (1966) A-cytodiagnosztika hazai helyzetéről, Magy. Onkol., 10, 1, 43-47 (Hung.).

During the last few years a new test has been developed which could become useful in mass screening. This is a method developed by Abelev & Tatarinov (USSR). With the use of alpha globulins an exact diagnosis can be given in primary cases of cancer of the liver. This immunological phenomenon is now under control in several areas of Africa where this disease is common. In areas of high risk for cancer of the liver, this test could become a test for mass screening, and at the same time be very useful for special epidemiological studies.

Detection of malignant tumours and pretumoral diseases of the skin has also proved particularly effective, mostly in the southern republics of the USSR. Compulsory examination of the skin of the whole body in every person examined, under a good light and with the use of a magnifying glass, contributes to the effective diagnosis of pretumoral diseases and malignant tumours of the skin. The conditions just outlined are obligatory also for detecting malignant tumours of the lower lip. Examinations have contributed to a threefold reduction in the proportion of neglected forms of malignant tumours of the lower lip.

Malignant tumours and pretumoral diseases of the breast are now being detected at considerably earlier stages than in the period preceding the introduction of mass screening. In any examination carried out by gynaecologists, therapists or surgeons, special attention should be given to examination of the mammary gland.

A detection programme in mass screening is very closely associated with a programme of cancer prevention, and it is difficult to make a complete differentiation between them. For example, when we have, after mass screening, a group of patients with precancer conditions, treating of them is a measure for prevention. We take all the necessary steps to have an exact diagnosis, and in several cases we find early stages of cancer. In this respect, it is impossible not to pay attention to the group of people with obligatory and facultative precancer conditions. The dispensarization - regular checking of their health situation - of large groups of these patients each year produces findings of cancer in situ and early stages of invasive cancer. Therefore in a mass screening campaign the detection of patients with precancer conditions is practically a step in the early detection of cancer. We give below a table which demonstrates the number of patients with precancer conditions who, in spite of curative measures, developed cancer. A detailed analysis of this group shows that in approximately 30 per cent. of the cases it was probably the cancer development which was not recognized properly when they were first registered.

In performing mass screening, there is a great need to prepare all health services to receive patients with suspicions of cancer or precancer conditions and to make available facilities for the necessary examinations. For example, the number of patients with precancer conditions of the cervix uteri who were found, after cytological examination, to need colposcopy - and many of them electrocoagulation measures - is quite high. In Leningrad it was proved that for 16.5 per cent. of patients with suspicions of cancer of the cervix, the diagnosis was confirmed. We give below a table demonstrating the findings in several mass screening programmes, in the first, second and third screening campaigns, and the number of patients treated afterwards.

4. Analysis of results

The cost of mass screening compared with other measures devoted to cancer control could represent a large proportion of the budget. The proof of the necessity to spend this money could first of all come from the number of patients who are detected in mass screening, and who can be treated. This means patients in early stages, but in these measures we should include not only patients with cancer - the number of them could be low - but also patients with precancer conditions and several chronic diseases, in which treatment could be the basis of prevention. This should change the views of public health authorities on the importance of such a heavy expenditure.

The analysis of results obtained in mass screening programmes is a test for this important measure.

After the period 1949-1952 when mass screening programmes became an obligatory measure in the USSR, within the framework of cancer control, in some areas in the first years approximately 18 per cent. of patients registered as new cases were sent from mass screenings. In Leningrad this figure was 7 per cent. After some years, this figure decreased and the main reason for this decrease was that mainly the same groups of people were screened each year. This gave to many public health administrators the feeling that it was not important to carry out these measures on a large scale every year, and this criticism was made to oncologists. The philosophy of oncologists was, from our point of view, logical. The decrease of findings of cancer in this case means an improvement in health, and in this instance the greatest importance is not in the finding of cancer but in the finding of and active treatment of chronic diseases, especially precancer conditions. From our point of view, the main attention should be paid to this group in mass screening programmes. On the other side is the population involved in mass screening. If we screen each year 20-30 per cent. of all the population which requires such screening, it is necessary to look for ways to include new groups in the screening programme. These consist mainly of the aged, people working in small offices or small farms, housewives and many others who are sometimes out of the range of the mass screening campaign. Only action from local physicians in combining their efforts with polyclinics, and consultations for women, could fill this gap.

In speaking of the effectiveness of mass prophylactic examinations, we should like to quote an analysis of our data on the results of examinations in the period 1946-1963.

Thus, in 1946-1952, when over 64 million examinations were carried out, 96 944 cases of malignant tumour were detected (0.15 per cent.) and 581 667 cases of pretumoral disease (0.9 per cent.).

In 1959, 31 810 618 examinations were carried out. 37 945 (0.12 per cent.) cases of malignant tumour were detected and 270 976 cases of pretumoral disease (0.85 per cent.).

The Minister of Health of the USSR, B. V. Petrovskij,¹ emphasized that prophylactic examinations are an effective weapon for diagnosing and preventing malignant tumours and quoted the results of examinations in 1963.

45 442 000 persons were examined. For every 100 000 persons examined 440 cases of malignant tumour were found in the rural areas and 60 cases in the urban areas.

B. V. Petrovskij remarked that it was essential to extend prophylactic examinations, paying particular attention to patients with protracted chronic illness of the gastrointestinal tract and the mammary glands, and that it was also necessary to improve the standard of the examinations.

L. F. Nikitina² reported on the results of prophylactic medical examinations in the RSFSR in 1964.

¹ Petrovskij, B. V. (1967) Topical problems of Soviet oncology, Transactions of the Third All-Union Conference of Oncologists, Moscow, 5-14.

² Nikitina, L. F. (1967) The organization of cancer control work in the RSFSR, Transactions of the Third All-Union Conference of Oncologists, 393-399.

Altogether 20.6 per cent. of the population of the Republic, or over 25 million persons, were examined, and a total of 0.07 per cent. were found to have malignant tumours while 0.85 per cent. had pretumoral diseases. The corresponding figures among the urban population were 0.05 per cent. and 0.88 per cent., and among the rural population 0.11 per cent. and 0.76 per cent. respectively. The great effectiveness of prophylactic examinations in a number of oblasts in the republic led in the period 1946-1964 to certain positive results in the early diagnosis and prophylaxis of cancer. Thus, among all those registered, the number of people to whom it was possible to give radical treatment was as high as 60 per cent., while the majority of those sent from prophylactic medical examination had tumours which were amenable to radical treatment.

I. T. Ševčenko¹ analysed material on the Ukrainian SSR. He states that the figures for malignant tumours ranged from 0.09 to 0.13 per cent. The regular carrying-out of prophylactic examinations increased the percentage of patients whose cases were diagnosed for the first time in the early stages of the disease to as much as 66 per cent. in a number of localities, and reduced the percentage of patients who applied for medical care only in the late stages.

S. L. Minc & E. M. Novikova² in describing the development of the oncological services in Moscow, have pointed out that hundreds of thousands of persons a year are examined under the regular medical examination procedure. In 1966, 2 500 000 persons were examined, and a large number of them were given fluorographic examinations in the tuberculosis control centres. Of the total number of recorded cases of lung cancer, 29.5 per cent. were detected by means of mass fluorographic examinations.

In a collection of papers on the health services and the health of the population in the Russian Federation, issued for the fiftieth anniversary of the Great October Socialist Revolution (Moscow, 1967) it is stated that 67 000 therapists, 20 000 surgeons and 10 000 radiologists in the Russian Federation alone took part in prophylactic examinations. By their combined efforts 213 000 cases of malignant tumour were discovered. As many as 20 per cent. of them had been detected by means of prophylactic medical examinations.

The general conclusion reached by most oncologists in the USSR is that prophylactic medical examinations among wide sections of the population are a useful measure. Thus N. N. Aleksandrov & Z. N. Gutman³ write that the examinations are necessary, but that the methods of carrying them out require further study and elaboration. In their opinion it is necessary to examine only those persons who present complaints, for that group needs more detailed examination, in many cases with X-ray and laboratory investigations. At the same time, when a large number of persons are being examined, it is not possible to examine each one at all fully and carefully, and in a number of cases this leads to an underestimation of particular symptoms in particular patients.

In view of this, they suggest the establishment of special centres for the diagnosis of malignant tumours and other illnesses, through which it would be possible to carry out combined examinations of large population groups and where in addition to the fluorography already carried out, a number of other examinations could be performed.

¹ Ševčenko, I. T. (1962) The basic principles of prophylaxis against malignant tumours, Kiev, 10, 86.

² Minc, S. L. & Novikova, E. M. (1967) Oncological services under the Health Department of Moscow City Council on the fiftieth anniversary of Soviet power. (A collection of papers from the Third Moscow City Oncological Conference, 9-10 October 1967.)

³ Aleksandrov, N. N. & Gutman, Z. N. (1967) Some unsolved questions in the organization of oncological services. (Transactions of the Third All-Union Conference of Oncologists, Moscow, 409-415.)

It seems to us that we must not in any circumstances give up mass prophylactic examinations. However, it is necessary to determine precisely what we expect from them and how we evaluate them. Mass prophylactic examinations are only the first stage in detecting among the large number of people examined those who require a second and more complete examination.

Mass screening has become of great importance in several special epidemiological studies. Since 1953, in our expeditions devoted to the study of geographic differences in distribution of cancers in several parts of the USSR, we used mass screening on many occasions as an epidemiological method. This method helped to prove facts about the high incidence of oesophageal cancers in several areas of Kazakhstan, and fluorography was used in this epidemiological study. It proved the rarity of breast cancer among local women in the Turkmenian republic by examining several thousands of women in different ethnic groups.

Mass screening was also used in a skin cancer epidemiological study in the areas of the Black Sea, Caspian Sea, White Sea, Baltic Sea and the Barents Sea. It was discovered that there was 3-1/2 times as much skin cancer of the face in the area of the Black and Caspian Seas in comparison with Nordic locations. The examples could be enlarged but the positive side of mass screening for epidemiological studies is already clear. Most of the tests used are of great epidemiological value.

5. Negative side of mass screening

When we speak on the negative side of mass screening, we hear from several sources the following opposition.

The present methods of detection and the special tests available are not sufficient to detect all types of tumours. This will only be achieved after developing new tests, mainly immunological, which could be specific for each site. Only then can mass screening be performed completely.

This opposition is vague. Today we have several tests and special cytological methods which could be used in mass screening. On the other hand, it is impossible to detect all forms of cancer in a mass screening campaign. There are still several hidden forms of cancer, the detection of which is difficult not only in mass screening but also in special hospital examinations.

The second opposition is the question of time which must be spent by a physician and auxiliary personnel in the mass screening campaign. Is it essential to spend this time in this manner, or perhaps it could be devoted to other types of work which would have more effect?

This point brings us to the question of two steps in mass screening, where the auxiliary personnel could separate completely healthy persons from those with any symptoms. They could take cytological smears, register cases and send to physicians only that proportion of the group which exhibit some symptoms or suspicions of precancer conditions.

On the negative side is the limited knowledge of medicine on the part of the auxiliary personnel, and as a result they may not recognize some cases where the symptoms are not clear. Special instructions in this respect are of great importance, but if you have a large community and some limitation on physicians' time, only such a two-step programme could fill the gap. We have had some experience in this in the Republic of the Ukraine, where it provided the possibility of screening 40 per cent. of the population approximately, and some important findings were derived, especially in the early stages of cancer of the cervix uteri.

Among the shortcomings of mass prophylactic examinations, mention must be made of insufficiently complete examinations. Thus E. I. Udincev¹ indicated that when 250 000 examinations were analysed, it was found that only 14.4 per cent. had included X-ray examinations and only 5.1 per cent. laboratory examinations. Even there, however, it must be emphasized that mass prophylactic examinations are only a first stage. It is important to keep under observation all persons suspected of suffering from particular diseases and to have available complete documentation.

Gvamičava, A. Z., Mchvetadze, V. A. & Čikovani, R. P.² state that in most prophylactic examinations there is still no properly co-ordinated system for deciding on the subsequent regular examinations of those who have already been examined, and that there is no complete documentation on the basis of which patients could be visited in their homes or called for further examinations. This comment could apply to a number of areas not only in the USSR but also in many other countries. A stricter organization of examinations would help considerably to improve their effectiveness.

¹ Udincev, E. I. (1966) Measures to further improve the quality and standards of medical services for the people of the Russian Federation in the light of the decisions of the Twenty-third Congress of the CPSU, Zdravoohranenie Rossijskoj Federacii, 11, 3-8.

² Gvamičava, A. R., Mchvetadze, V. A. & Čikovani, R. P. (1966) Aspects of the oncological services for the people of Georgia/. Summaries of papers read at a joint session of the Oncological Institute of the Ministry of Health of the USSR, the Institute of Experimental and Clinical Oncology of the Academy of Medical Sciences of the USSR, and the Leningrad Institute of Oncology of the Ministry of Health of the USSR, Tbilisi, 17-19.