SWEDEN'S ANTI-CANCER CAMPAIGN

GÖSTA FORSELL

According to the statistics (1) published by Professor Gunnar Nyström the number of deaths from malignant tumours amounted, in the year 1912, to 945.4 (cancer 889.5, sarcoma 55.9), and the number of fresh cases of cancer to 1,368.6 (cancer 1,261.5, sarcoma 107.1) per million of the average population in Sweden. If the number of fresh cases annually is assumed to have increased since then at the same rate as the mortality, the number of fresh cancer cases in Sweden now amounts in round figures to 10,000 per annum. According to the Danish "moment statistics," which are perhaps the most complete of their kind that can be achieved in respect of the morbidity of cancer, there occur on a given day about 430 cases of cancer per million of the average population, which corresponds to approximately 2,500 cases of cancer occurring simultaneously in the whole of Sweden.

The importance of these figures is augmented still further by the knowledge that cancer is constantly increasing. Whatever may be the cause of this increase, it means that the community has a duty in the care and treatment of cancer patients that becomes more and more onerous every year.

Under such circumstances it is a sine qua non at the very first possible opportunity to establish as effective and efficient, as firm and economical an organisation as possible, for the purpose of making existing means of treatment and remedy available for all those who may derive some benefit from it.

The anti-cancer campaign is carried on along two great main lines: practical hospital treatment and research and instruction relating to cancer and its treatment.

Research and instruction form, as we are aware, the very foundation of the fight against cancer. I am here, however, forced to confine myself to the organisation of the care and treatment of cases of cancer, and am only able to touch very briefly upon other branches of the cancer campaign.

ORGANISATION OF THE CARE AND TREATMENT OF CANCER PATIENTS

As is well-known, we do not possess a sufficient knowledge of the causes and vital conditions of cancer to enable us to institute organised measures for prophylactic purposes on the part of the community, otherwise than in respect of steps taken against some relatively rare trade-diseases that may predispose to cancer. The most important desideratum at present in respect of cancer prophylaxis is that steps be

taken to protect the patients and nursing staff in their work with roentgen and radium rays, and that these precautions be controlled through the agency of the State Medical Board. With the knowledge we have at present the practical measures for combating cancer incumbent upon the community will almost altogether have to be devoted towards giving to as many cancer patients as possible such efficient and effective treatment as is possible with methods now available.

The only methods of treatment that have hitherto attained such a sufficient efficiency and effectiveness as to be considered necessary adjuncts in the treatment of cancer patients are, as is now generally acknowledged, surgery and radiotherapy, i.e. the treatment with radium and roentgen-rays.

**Organisation of the Surgical Treatment of Cancer**

The establishment of the surgical clinic after the introduction of asepsis was the great event in the struggle against cancer during the last century. The problem of surgically treating cancer patients who may derive some benefit from the surgical treatment, was solved by the erection of surgical hospitals and surgical wards.

The surgical treatment of cancer patients in Sweden takes place in the surgical wards and surgical special departments. No separate or special hospitals for surgical treatment of cancer have been established in Sweden.

Through the distribution of general hospitals throughout the country, corresponding to the nursing requirements, all cancer patients who can be operated upon have access to surgical treatment by an excellent staff of well-trained surgeons. Surgical treatment of cancer in Sweden has thus, just as in other civilised countries, for quite a long time been firmly and efficiently organised, and this organisation covers the whole country. Surgery still constitutes the chief method for the treatment of operable tumours. Even where the very best resources for radiological treatment are available, the majority of operable cancer cases—according to the experience of the Radiumhemmet about 60 per cent—belong altogether to the sphere of surgery. Where a well-equipped and well-organised clinic for radiological treatment under the supervision of experienced, specially trained medical officers is not available, surgery is still the only method of treatment that can and should be employed in the case of operable tumours.

Although the surgical technique of treatment and the organisation of surgical treatment in Sweden have reached a high degree of perfection, the scope of surgery for the treatment of cancer is nevertheless, as we are aware, rather limited. According to the statistics collected by Prof. Gunnar Nyström about two-thirds of our cancer patients cannot be treated surgically, and of those operated upon, at the outside only one-third can be cured of their disease by operation. The vast majority of cancer patients are, therefore, in need of some other form of treatment than surgery.
Hence, the importance of fully utilising the resources of radiotherapy in the treatment of cancer patients is obvious.

**Organisation of Radiotherapy for Cancer**

The organisation of radiotherapy for cancer is, at the present time, throughout the world, the subject of the very keenest interest. Everywhere this problem, which undoubtedly presents the most vital, and perhaps also the most difficult task in the organisation of practical cancer control, is being wrestled with.

Radiotherapy for cancer in Sweden was undertaken at an early date with keen interest. The fact that it was the Swedish doctors Tor Stenbeck and Tage Sjögren who first succeeded in curing cancer of the skin by roentgen therapy contributed towards this interest to a large degree. In Sweden, as in the majority of other countries, it was private medical practitioners who took up radiotherapy for cancer. During the first decade of this century roentgen and radium treatment for cancer were split up amongst the hospitals that had established roentgen laboratories. At these, radiotherapy, during its earlier stage, was conducted in the majority of places by medical men who had not had any opportunity of undergoing any special training in radiotherapy, and who conducted this treatment as a side-line frequently in conjunction with a very large surgical practice.

It was the medical faculties that took the initiative in the establishment at the University Hospitals of institutes for roentgen diagnostics and radiotherapy under the leadership of specially trained radiologists. Such institutions were established, in the year 1906, at the University Hospital in Stockholm (Serafimer Hospital), and, in 1908 and 1909, at the University Hospitals of both Uppsala and Lund. It is from the medical offices, established at the central radiological sections of these hospitals, that there were subsequently developed the present offices of chief radiologists and of instructors in medical radiology. To commence with, they formally held office as assistants to professors in surgery, but were, from the very start, actually given a perfectly independent position in respect of both instruction and treatment. These first radiologists received their special training partly by private studies and partly by studies in Germany, Austria, and France. At this time the Swedish radiological institutions were devoid of beds of their own for radiotherapy.

**Origin of the Radiotherapeutic Clinic at the Radiumhemmet:** Already in the year 1909 the then director of the Serafimer Hospital, John Berg, professor of surgery, as well as the chief of its radiological institution, realised that the great possibilities which roentgen and radium therapy seemed to present, especially for the treatment of malignant tumours, could not be fully developed and utilised without having access to an independent radiotherapeutic clinic, where the methods of radiotherapy could be tested and improved under uniform and scientifically trained management. But at the Serafimer Hospital there was no
room for establishing such a clinic, nor was it very likely that a government grant for one could be obtained at that time.

Through Professor John Berg's influence private means were successfully collected for the establishment, on leased premises in a dwelling-house at 10, Scheelelegatan, Stockholm, of a small clinic with 16 beds with appurtenant policlinic for radiotherapy of cancer. Thus the Radiumhemmet—the Radium Home—was set up in the year 1910, originally altogether under private management and administration. Its prototypes were to be found in the Samariterhaus, founded in 1906 by Czerny, in Heidelberg, and also Béclère's radiotherapeutic clinic at the Hospital of St. Antoine, and the Institut du Radium conducted by Wickham, both in Paris.

In the year 1910 was also founded the Swedish Anti-Cancer Society on the lines of those anti-cancer societies that around the beginning of the century had cropped up in the great civilised countries. However, in the Swedish Anti-Cancer Society there occurred already from the very start a distribution of work which, as a rule, was not introduced by the anti-cancer societies on the Continent until about ten to fifteen years later. The parent society, the Swedish Anti-Cancer Society, like the majority of contemporary anti-cancer societies, devoted most of its interest and its labours to cancer research, and particularly to statistics on the frequency of cancer and its spread in Sweden. This work has found its foremost expression in the publication, in 1922, of the work Kräftsjukdomarne i Sverige or Cancer in Sweden, by Professor Gunnar Nystrom.

At the same time there was formed an independently working subsidiary society, Cancerföreningen i Stockholm or the Stockholm Anti-Cancer Society, with the particular, practical task of supporting the development of radiotherapy for cancer. This Stockholm section, in 1911, took over the then already organised Radiumhemmet.

Two main tasks faced the first organisation of radiotherapy for cancer, viz. first the scientific testing of the new therapeutic method and furthering its development, and secondly, the finding of the suitable methods and means for efficiently incorporating the same in the whole country's hospital system in those spheres of tumour therapy where it had been found effective. The Stockholm Anti-Cancer Society has tried to fulfil the first task by means of its pioneer radiotherapeutic clinic, the Radiumhemmet. The second mission, namely to bring about a general organisation for radiotherapy in cancer, has to be solved and carried into effect by co-operation between all the authorities who are responsible for public hospital organisation in Sweden.

Organisation of the Radiotherapeutic Clinic: H. M. Queen Victoria was until the time of her death the august and active patron of the Radiumhemmet.

The Committee of the Stockholm Anti-Cancer Society is likewise the Committee of the Radiumhemmet. This Committee was from the very beginning composed in such a way that it would at the same time offer expert knowledge in those branches of medicine which are most im-
mediately interested in the cancer control, and constitute a link with those authorities who have charge of practical care and treatment of the sick. In the first Committee, surgery was represented by Professor John Berg, who was its chairman. Gynaecology was represented by Professor Hjalmar Forssner, pathology by Professor Gunnar Hedrén, both the latter subsequently succeeding each other as rectors of the Caroline Institute in Stockholm. Internal medicine was represented by the chief physician, Doctor E. 0. Hultgren, and radiology by Professor Gösta Forssell, who was chief radiologist at the Radiumhemmet until 1927, and secretary of the Committee until 1922. The Government appoints an official representative on the Committee, hitherto the chairman, and the City of Stockholm likewise an official representative who ever since the inception of the society has been Lord Justice A. Bergström. His Excellency the Lord High Steward O. Printzsköld was also a member of this first Committee. The treasurer during the organisation period of the Radiumhemmet was one of the foremost Swedish financiers, a director of the Stockholm’s Enskilda Bank, Joseph Nachmanson. Especially active in the organisation of the Radiumhemmet was the Home’s first matron, Miss Alma Wallengren.

The labours of the Committee have been performed in very close and fruitful co-operation with those authorities and organisations representing the public hospital system, the scientific medical work, and the training of medical men in this country.

The Radiumhemmet was housed in premises outside the hospital, by no means with the intention of isolating either radiotherapy or cancer therapy from other treatments, but through lack of space, and in the expectation that the new building for the entire University Hospital in Stockholm, which was even then being planned, would soon be erected. However, the Radiumhemmet has been in very intimate contact with the University Hospital, for the professor in medical radiology at the Caroline Institute was chief radiologist of the Radiumhemmet until 1927, and has been chairman of its Committee since then. Moreover, the Radiumhemmet has served as a training centre for those radiologists who are receiving their education at the Caroline Institute.

At the same time, as the work and activity of the Radiumhemmet have become more far-reaching, the necessity of its re-union with the University clinics and other institutions has also become more and more obvious, both on account of the radiotherapeutic clinic’s need of close co-operation with other medical branches, and by reason of the clinical hospital’s need of this clinic for nursing and tuition. According to an Act of Parliament of the year 1931, the Radiumhemmet is to be amalgamated with the Caroline Institute, forming the latter’s radiotherapeutic clinic in the new edifice for the clinics of the Caroline Institute which, at long last, was voted for by Parliament last year.

As stated above, the Radiumhemmet was originally established as an institution for the scientific investigation and the further development and improvement of radiotherapy in cancer. However, as better and better results became obtainable by radiotherapy, especially from
radium treatment, the Radiumhemmet was more and more resorted to for cancer patients from Stockholm, and, finally, from the whole country.

In the year 1916, the Radiumhemmet could no longer be accommodated in its old premises. As the new building of the University Hospital still seemed to be far off, the premises formerly occupied by the Schartau Commercial School were rented. The Radiumhemmet was now enlarged to accommodate 34 in-patients, and the premises for its therapeutic and scientific sections were much larger. It was further enlarged by another 22 beds in 1929, so that now it has accommodation for 56 in-patients, 5 of them in private or semi-private wards. The increase in the nursing task of the Radiumhemmet is seen from the following figures.

In the year 1917, the first year in the new premises, the Radiumhemmet accommodated 538 in-patients, and dealt with 831 out-patients. During the year 1930 the number of in-patients was 1,659, of whom 1,447, or 87 per cent, suffered from malignant tumours. The remainder were patients suffering from such benign tumours or other complaints than tumours for which radiotherapy constitutes the main treatment. Through lack of accommodation, the number of these patients had, however, to be seriously circumscribed.

Over 7,000 out-patients were treated at the Radiumhemmet in 1930. One can get an idea of the importance which the radiological treatment of tumours has assumed, if we know that in the same year—1930—altogether 1,031 patients were being treated at all the public surgical hospitals and special departments in Stockholm for malignant tumours or tumours without histological diagnosis. Of these a fairly large number, together with surgical treatment, have pre- or post-operatively been given radiotherapy at the roentgen departments of the respective hospitals themselves. How many malignant tumours are being treated in the surgical out-patient departments, I am unable to state, but they must be rather few in proportion to the cancer patients who have been dealt with as out-patients at the Radiumhemmet, to judge from the few operations performed for malignant tumours in the surgical out-patient departments.

Time will not permit me to deal in detail with the radiotherapeutic clinic’s inner organisation. I will only mention that in-patient wards and out-patient departments in their general organisation differ very little from a surgical clinic. What imparts to the radiotherapeutic clinic its particular stamp, is its special working sections, namely: its institutions for radium treatment and for roentgen treatment; its section for controlling the results of treatments and for statistics; its section for social aid and the procuring of travelling allowances for pauper patients; its physical and pathological sections for scientific research and scientific control of the clinical work. A separate organisation has been set up for particularly careful control of the radium supply on hand, and also for protective measures for patients and staff.

The clinic of the Radiumhemmet is divided into a general and a gyn-
Professor Gösta Forssell was in charge of the former, and was also chief radiologist of the Radiumhemmet until the year 1926. In 1927, when Forssell, after John Berg, became chairman of the Committee, Dr. Elis Berven was appointed chief of the Radiumhemmet. Dr. James Heyman, lecturer on gynaecology and obstetrics at the Caroline Institute, is in charge of the gynaecological department of the Radiumhemmet. All the members of the staff of the Radiumhemmet have actively contributed towards elaborating its organisation.

The physical and pathological departments are in charge of their own chiefs, who perform their scientific tasks independently. As regards the work connected with the scientific control of the clinical work, the physicist and the pathologist are subordinated to the chief of the radiotherapeutic clinic.

With regard to the organisation of the pathological department, and the duties connected with the same in a radiotherapeutic clinic, the head of this department, Doctor Olof Reuterwall, will give his own account.2

The physical department, which is in charge of Doctor Rolf Sievert, exercises, apart from its own scientific duties for the development and improvement of radiotherapy, the physical control of the roentgen and radium technique of the clinic, and also the control of the roentgen and radium instruments and of the safety measures.

It may further be pointed out that in the physical department there has been established an ambulatory physical section, which now controls the working conditions and safety measures in all the roentgen departments in Sweden, which are in charge of expertly trained radiologists.

In Sweden radium has never been lent for use by doctors who lacked special training in radiotherapy. When radium is to be employed in conjunction with operations in the surgical departments, a trained radiologist is always present. The combined surgical-radiotherapeutical treatment is mapped out after consultation between the surgeon and the radiologist. The radiological pre-operative and post-operative treatment is given by the radiologist.

In Sweden we have neither, either in conjunction with the surgical clinics or at the radiotherapeutic clinics, any separate channels for tracing new cancer cases, but we try to achieve this by means of instruction and information for medical practitioners, hospital employees, and the general public. In our opinion the medical practitioners have to constitute the main channel for tracing cancer cases.

Nor have we any other special or separate consulting offices for cancer patients than the out-patient departments of hospitals, especially the surgical and radiological out-patient departments where both the medical practitioners and the general public have learned to seek advice and treatment for cancer patients. On the other hand, we have, as far as possible, tried to give immediate treatment and attention to those cancer patients who have been sent to us, by facilitating their journeys to the place for treatment, and to the greatest possible extent procuring

the means for treatment and accommodation. We have established a thoroughly organised department for the purpose of re-admitting a patient who has been prescribed further treatment, for controlling the results of treatment, and for supervising and following up the patients over a long period of time.

We have also succeeded, in the majority of cases since 1910, in following up patients treated at the Radiumhemmet, thanks to the assistance on the part of keenly interested medical practitioners throughout the country. The annual report on the work of the Radiumhemmet contains an account in English of the treatment of all patients admitted to the Radiumhemmet since 1921 (2). Perhaps the most important reason why this control and supervision or following-up could be accomplished, is to be found in the fact that the Swedish State since the year 1918 has paid for the journeys of pauper patients to and from the Radiumhemmet, and this annual grant amounted, in the year 1930, to nearly 100,000 (96,603:95) Sw. Crowns.

Through lack of space no other patients can be admitted to the central radiotherapeutic clinics except those in whom, from experience gained, a material improvement or cure can be expected.

We are still without a satisfactory organisation for looking after those cancer patients who neither through surgery nor radiotherapy have any prospect of attaining any material improvement or cure. These patients are nursed at their homes where their nursing is often attended by the utmost difficulties, or are sent to existing nursing institutions for chronic diseases. It is desirable that for those incurable cancer patients who are in need of hospital treatment, and may benefit by temporary amelioration of their condition by radiotherapy, accommodation should be made in wards for chronic diseases maintained at public hospitals which are equipped with a radiotherapeutic clinic, or with a special department for radiology.

Practically all the patients at the Radiumhemmet are sent there by the medical practitioners in the country, or from the general hospitals and out-patient departments. The patients are sent back by us at the end of the treatment to the doctor who sent them, or to the medical officer of a hospital who supervises the following-up of the patient, and possibly the nursing, in the cases which cannot be cured by the treatment. The collaboration and co-operation with the medical practitioners has been very good. Their interest in radiotherapy is growing from year to year, as is also their knowledge of the indications for surgery and radiotherapy in cancer.

The Radiumhemmet is still largely supported by contributions from the Stockholm Anti-Cancer Society, which through private donations has collected altogether about 2,200,000 Sw. Crowns. In the same measure as the importance of the Radiumhemmet for the care of the sick and as an institution for purposes of training grew, it has been in receipt of support and aid from the State and the City Council. The City of Stockholm, in 1913, presented the Forsgren Fund of 500,000 Sw. Crowns, and the income from this fund is used for the upkeep of the
work at the Radiumhemmet. Parliament has repeatedly voted grants for the purchase of roentgen apparatus and radium, and the State has, since the year 1920, been supporting the Radiumhemmet's out-patient department with a grant of 15,000 Sw. Crowns annually, and it also pays a certain sum per day for the upkeep and nursing of in-patients, this amount now being 2:50 Sw. Crowns per day per patient. In addition, the State pays the travelling expenses of pauper patients.

The total State grant in 1930 amounted to 155,821 Sw. Crowns, and the Anti-Cancer Society's contribution towards the upkeep of the Radiumhemmet in that year amounted to 110,000 Sw. Crowns. The

The total expenditure of the Radiumhemmet and its research department amounted in 1930 to 447,170 Sw. Crowns.

At present the Radiumhemmet has at its disposal slightly over 5 grammes of radium element (5,026.31 mg.) in the form of sulphate of radium; 3 grammes of this belong to King Gustaf the Vth's Jubilee Fund, ½ gramme was purchased by State grant, and the remainder has been obtained through private donations and grants from the Stockholm Anti-Cancer Society.

As regards further information or data concerning the internal organisation of the Radiumhemmet, as well as the results of the work done there, I beg to refer to existing publications (3-9).
Adaptation of Radiotherapy for Cancer in the Hospital System of the Whole Country: The development of the organs for radiotherapy for cancer has in Sweden on the whole taken such a course that radiology has been allotted its own institutions in the shape of central roentgen departments at most of the large public hospitals in the country, and that these have been placed in charge of chief radiologists who have been specially trained in this branch at the Radiumhemmet or at the radiotherapeutic departments of the University Hospitals. The central roentgen institutions of these hospitals took over the task of giving radiotherapeutic treatment to cancer patients. Radiotherapy for cancer was thus from the beginning brought within the scope of the general radiological work of the public hospitals.

During the first decade of the century there was thus established, apart from the three radiological university institutions and the Radiumhemmet, a central institute for radiology at the Malmö City Hospital. During the second decade there were established only two new central institutions for radiology, in charge of specially trained medical officers, viz. at the Sahlgren Hospital in Gothenburg (1911) and at the Sabbatsberg Hospital in Stockholm (1919). During the last decade development has progressed more swiftly. Before this time most of the public hospitals in Sweden were in charge of a surgeon as chief medical officer, but during the last decade a division of the work has been effected, so that the bigger hospitals are divided into surgical and medical departments, each one in charge of a chief surgeon or physician. Furthermore, central hospitals have been established in most counties, and these have been equipped with special departments for different branches of practical medicine.

As a rule the office of chief radiologist has been instituted simultaneously with the splitting up of a hospital into medical and surgical sections. In this way central institutions for radiology have, since 1921, been established at 22 hospitals, so that at present there are in Sweden 29 independent radiological departments, distributed throughout the country, in charge of specially trained chief radiologists. This corresponds to a radiological special department for every 200,000 inhabitants.

The organisation for radiotherapy of tumours which has grown up as the result of the needs of treatment and on the initiative of the local hospital authorities, has thus assumed a fairly large and uniform distribution, but radiotherapy for cancer has, from the beginning, been restricted and centralised to a far higher degree than surgical treatment. Experience showed, however, that a still greater centralisation of radiotherapy was necessary in respect of the most important fields of radiotherapy for cancer.

As long as radiotherapy was practically only being used as a palliative in inoperable cases, or as a last resource for salvation through postoperative treatment, where a radical operation had been unsuccessful, it did not seem necessary for the community to make any very severe claims on the special equipment for radiotherapy for tumours.
But after it had been ascertained through the experience gained at the radiotherapeutic clinics that a clinical cure by radiotherapy can be attained in several, and larger, groups of malignant tumours, and that the permanency of the radio-cure, where such can be attained, is equal to that obtained after a surgical operation (5, 6), the public had to insist upon getting specially trained medical officers and equipment for radiotherapy of tumours.

The direct and obvious reason why centralisation was necessary was the circumstance that very much better results in cancer therapy were attained at the radiotherapeutic clinics than at those radiological institutions where radiotherapy had not been separated from roentgen diagnostics, and developed into an independent department equipped with the necessary aids.

The radiotherapeutic clinics in Stockholm and Lund, which from the beginning had been established for local requirements, were overcrowded with patients from all over the country.

On the other hand, the roentgen diagnostic work and roentgen therapy in other spheres than tumours had, at the big hospitals, grown to such an extent that the duties there alone called for the services of one man entirely.

The opening of the Radiumhemmet, in 1910, was the first expression for the need of differentiating between institutions for roentgen diagnostics and for radiotherapy.

In the south of Sweden, the University of Lund followed Stockholm's example and opened, in 1918, a radiotherapeutic university clinic with accommodation for 18 in-patients, in charge of the lecturer on medical radiology, who, in the radiotherapeutic department, has at his disposal a specially trained assistant radiologist and nursing staff.

The radiotherapeutic department of this hospital is probably one of the first, if not the first, radiotherapeutic clinic established as a link in a university hospital equivalent to the other clinics. This clinic has departments for roentgen and radium treatment, and has at present at its disposal 24 beds which are very much in demand, and a supply of approximately 2 grammes (1905 mg.) of radium element; 1½ grammes of the radium supply at Lund belong to the Jubilee Fund, 232 mg. have been obtained by grants from the County Council, and the remainder, 173 mg., have been presented by private persons.

The largest public hospital in the west of Sweden, Sahlgren's Hospital in Gothenburg, in the year 1921 established a separate ward for radiotherapy in charge of the chief of the central roentgen institute. In the year 1930, this radiotherapeutic department received its own chief, and is now altogether detached from the diagnostic central institution, and has 25 beds for in-patients, and about 1½ gm. of radium (1,717 mg.); 1½ gm. of this radium belong to the Jubilee Fund, 106 mg. have been bought with grants made by the City of Gothenburg, and 111 mg. have been acquired by private contributions.

At the new hospital which the City of Stockholm is now planning to erect in the southern part of the city, roentgen diagnostics and radio-
therapy are to have their separate departments in charge of their own chief radiologists.

Amongst other provincial hospitals, the roentgen department at Örebro has a ward with 16 beds. Apart from the first-mentioned three hospitals 6 of the bigger hospitals in the country own minor quantities of radium, altogether 676 mg., the bulk of all this being bought through private contributions.

At present practically all radium therapy, combined radium-roentgen treatment, and the surgical operations connected with radium therapy, take place at the central radiotherapeutic clinics or in direct co-operation with the same.

At those hospitals which have special roentgenological departments, some cases of tumour are treated in which only roentgen treatment or combined surgical-roentgenological treatment can be used. But roentgen treatment of those cancer cases where permanent results may be expected is being transferred more and more to the central radiotherapeutic clinics.

Practical experience has thus shown that a thorough exploitation of the radiotherapeutic resources for cancer calls for quite special conditions, first and foremost a separate clinic with a highly qualified and specially trained medical staff, and with a vast and expensive administrative and technical equipment.

Time will not permit me to render a detailed account here of the demands that must be made upon a radiotherapeutic clinic, but I refer to our works published on this subject (3, 4, 7, 8, 9).

Still, I would like to emphasize the fact that a very important, though by no means the most important, reason for the centralisation of radiotherapy of cancer, has been the necessity of collecting, for treatment in one place, as large a quantity of radium as possible. This centralisation of the radium therapy is, in our opinion, necessary, not only for economical reasons but, and chiefly, for medical reasons. The importance of teleradiotherapy, calling for large quantities of radium, is growing day by day, and constitutes, in my opinion, the most important factor in the further development of radiotherapy for tumours.

In the majority of cases radium treatment is superior to roentgen treatment, both economically and, chiefly, therapeutically. Roentgen treatment is, however, indispensable as a substitute for radium treatment that cannot be obtained for economic reasons, and is, within certain limited spheres, superior to radium treatment.

At any rate, a radiotherapeutic clinic whose task shall be to fully utilise radiotherapy and to further develop the same, must have at its disposal resources both for multifarious brachyradium therapy—short distance treatment—teleradium treatment, and roentgen treatment.

According to the experience gained in Sweden, a radium supply of at least 2½ grammes and at least 25 beds at a clinic for radiotherapy of cancer are required for each million inhabitants, provided, of course, that radiotherapy is arranged in such a way that the radium is constantly in use night and day.
A practical organisation for radiotherapy of cancer must satisfy the two essential claims, that is fully to utilise the resources of radiotherapy and also to make this treatment available not merely for some places or for more fortunately situated patients, but for all cancer patients in the country who may derive some material benefit from the same. Both these tasks must be fulfilled in as economical a way as possible.

Experience, both in Sweden and abroad, has fully demonstrated that these demands can be satisfied only by close centralisation.

To bring about a general and fixed organisation for establishing central institutions for the whole country, or for the greater part of it, greater difficulties are encountered than for the erection of radiotherapeutic departments intended for minor areas, which will be defrayed and administered by one and the same hospital owner, and will come under a joint hospital district.

In order to be able to carry into effect such a national organisation for radiotherapeutic treatment of those cases for whose efficient treatment sufficient resources are lacking locally, certain fundamental psychological and material conditions are necessary.

In the first instance it will be necessary that not only the medical officers but also the public, and chiefly the authorities who have to make grants, are convinced, through practical experience, of the value of radiotherapy for cancer and of the importance of this treatment being given at clinics specially equipped for this purpose. It must be part and parcel of public consciousness that such clinics for economical and medical reasons can be established only at few places in the country, and that, consequently, strict centralisation is necessary if the cancer patients, on the whole, are to benefit by the prospects and possibilities of a cure or prolonged improvement offered by radiotherapy.

Such a general comprehension of the value of radiotherapy and the importance of centralisation has been brought about in Sweden through the work done by the Radiumhemmet during a period of 20 years.

The result of this is evidenced by the national collection, made in 1928, to commemorate King Gustaf Vth's 70th birthday. This national gift was presented by the King to the cancer campaign, and it was then announced that the money collected would chiefly be employed as a contribution for the establishment of central institutions for radiotherapy of cancer, which were to be available for the whole country.

Within two months there was collected for this purpose, chiefly in small amounts, a sum of 5 million Sw. Crowns. But then there is hardly a parish in Sweden where there cannot be found some patient cured at the Radiumhemmet or at the Lund Clinic, who is able to bear witness to the value of radiotherapy at a well-equipped radiotherapeutic clinic.

In the organisation of central radiotherapeutic clinics it is furthermore a question of overcoming selfish local interests in the selection of centres, and of making the hospital authorities understand that it is not only a question of providing radium in smaller or larger quantities,
but that neither radium nor the roentgen-rays possess any very great value for the treatment of cancer without a clinic fully equipped for this treatment, with personal and material resources.

The comprehension of the importance of this central organisation for this special treatment by the local hospital authorities has, however, been greatly facilitated by previous, similarly greatly centralised, organisations that have been established through co-operation between the State, the county authorities, and the local hospital authorities. I am, in this connection, thinking chiefly of the central cripples’ homes, centres for the treatment of lupus, and tuberculosis hospitals.

The principles for the distribution of the cancer patients among the central radiotherapeutic clinics and the roentgen departments of local hospitals are also laid down along the general lines for other strictly centralised special treatments.

The recommendations to the central institutions shall, therefore, for those patients towards whose treatment at the radiotherapeutic centres the local hospital authorities contribute, be signed by the district medical officer. Those patients who pay for their own treatment may choose the place where they wish to be treated.

The greatest and most important problem relating to the organisation was, however, the economic organisation for the establishment and upkeep of the central institutions.

However, this problem was solved by the Jubilee Fund and the Anti-Cancer Society making available a total amount of about 7 million Sw. Crowns for the organisation of central institutions for radiotherapy of cancer. Through deliberations and collaboration between delegates of the Medical Board, the hospital authorities of the country, the Jubilee Fund, and the Anti-Cancer Society, a unanimous proposal was adopted for a joint organisation for the development of the radiotherapeutic clinics at Stockholm, Lund, and Gothenburg into central clinics for radiotherapy for the whole country.

This organisation has gained the sanction and approval of the respective hospital managements, and has, in principle, been passed by the 1931 Parliament.

According to the organisation now carried into effect, the cost of the premises and equipment at the central institutions for those beds open to the whole country, will be defrayed by the Jubilee Fund and the Anti-Cancer Society. The central institutions are to be called “Gustav Vth’s Jubilee Clinic” in, respectively, Stockholm, Lund, and Gothenburg. The Jubilee Clinic in Stockholm shall have 100 beds; the Jubilee Clinics at Lund and Gothenburg 50 beds each.

The Jubilee Clinics in Stockholm and Lund shall be run in conjunction with the respective universities. Of the first equipment of radium, altogether about 9 grammes, about 5 grammes are paid for by the Jubilee Fund, the remainder chiefly by the Anti-Cancer Society and private donors, a small portion by the State and the owners of hospitals.

The central radiotherapeutic clinics serve at the same time as general radiotherapeutic wards and out-patient departments for the local hos-
hospital district. The beds installed there solely for local treatment requirements, are paid for by the local hospital authorities, and so is also all accessory equipment.

While the Jubilee Fund and the Anti-Cancer Society have hitherto concentrated their efforts on the establishing and equipping of the central institutions for radiotherapy of cancer, the expenses for the running and future upkeep and development are to be defrayed jointly by the State and all the hospital owners of the country, on the same principles as those in operation for all other centralised special medical treatments.

**Distribution of the Expenses for the Cancer Campaign in Sweden**

- **Travelling Expenses for Poor Patients to and from the Radiotherapeutic Centres.**
- **Special Treatments and Ward Expenses.**
  - **The Swedish State.**
  - **Societies and Private Persons.**
  - **Counties, Communities & Other Owners of Hospitals.**
  - **Fees paid by Patients.**
- **Medical Training and Tuition.**
- **Scientific Research. Promoting and Testing of New Methods of Treatment, Statistics. Instructing the General Public.**
- **Social Service. Dispensaries. Nursing Institutions.**

The patients in public wards who are not paupers pay a small daily fee; for pauper patients this fee is paid by the local authorities of the place from which they come.

The balance of the charges for the care and treatment of patients in a public ward is paid for by the State and the respective hospital authorities according to an agreement entered into between them.

For well-to-do patients there are, in the central clinics, private rooms, where the charges for nursing and treatment are paid by the patients themselves.

The State defrays the travelling expenses for pauper patients to and from the central radiotherapeutic clinics.

After the completion of the Jubilee Fund clinics, when the State and the hospital authorities have altogether taken over the expenses for cancer therapy, the efforts made by the Jubilee Fund and the Anti-Cancer Society are chiefly to be devoted to cancer research and the
introduction of new therapeutic methods, in addition to promoting public enlightenment.

A diagram shows the distribution of the costs for the anti-cancer campaign in Sweden along the lines laid down.

RESEARCH WORK, TUITION AND POPULAR INSTRUCTION

Cancer research and information appertaining to it are, in Sweden, a matter for the theoretical and clinical institutions of the medical faculties and the Caroline Institute.

The Jubilee Fund distributes annually 20,000 Sw. Crowns in aid of scientific cancer research and the treatment of cancer. Furthermore, two more funds have been established in Sweden for this purpose, viz. The Swedish Medical Society’s “Bohman’s Fund,” amounting to approximately 533,000 Sw. Crowns and the Caroline Institute’s “Ljunggren Brothers’ Fund,” amounting to about 300,000 Sw. Crowns. The total annual distribution from these funds in support of cancer research is about 50,000 Sw. Crowns.

Tuition in radiology has, ever since the year 1914, been one of the subjects in the curriculum of the Caroline Institute, and, since the year 1927, at the Universities of Uppsala and Lund.

While in Sweden a course of tuition in roentgen diagnostics is compulsory for all medical students, courses in radiotherapy are voluntary, but are attended by practically all those medical students who wish to devote themselves to hospital work.

Special experience in radiotherapy for cancer is acquired by acting as assistant medical officer at radiotherapeutic clinics. As to further particulars and details concerning Swedish instruction and tuition in radiotherapy, I beg to refer to my work on Teaching and Training in Medical Radiology (9).

I wish only to emphasize here the important fact that those medical men who are going to devote their time and labour to the service of the radiotherapeutic clinic, must, besides their special radiotherapeutic knowledge, have undergone sufficient training at a general or special surgical clinic in order to know the indications for surgery in cancer, and in order to be able to carry out such minor surgical operations as may be necessary in connection with radiotherapy, and which can, and should, be performed at the radiotherapeutic clinic.

Radical surgical operations in Sweden are always passed on to the surgical clinics and special clinics.

On the other hand, the surgeons must receive sufficient instruction and tuition in radiotherapy to enable them to recognise its indications, and the principles for co-operation between radiotherapy and surgery.

Enlightenment on the subject of cancer has so far only been given by the anti-cancer societies or by private medical practitioners.

According to the opinion prevailing in Sweden, popular instruction concerning cancer should chiefly take place indirectly through medical officers and hospital staffs, and less through publications addressed to the general public. However, pamphlets have repeatedly been distrib-
uted among the entire population. Thus in 1928, 2½ million copies of a pamphlet were distributed with the daily papers, and in the cheap almanac which is read by the majority of the adult population in Sweden, and which each year contains an article on popular education, an article on cancer was inserted in 1929.

The main purpose with popular instruction concerning radiotherapy of cancer is, in my opinion, not to instil into the general public a theoretical and popular knowledge of this therapy. Propaganda in word and picture is both useful and necessary. But the chief thing is, by practical experience from the results of the treatment, to gain confidence in radiotherapy of cancer both amongst the general public and the medical practitioners, and particularly among the authorities who have to allocate grants.

To gain economic support, convincing personal experience is required. A large number of cancer patients in all parts of the country cured by radiotherapy make the best propaganda.

The qualifications for such a living propaganda are, however, access to one or more well-equipped pioneer radiotherapeutic clinics in charge of experienced medical officers who are devoting themselves entirely to radiotherapy.

References