HOW THE CANCER PROBLEM IS TACKLED IN WESTERN COUNTRIES

With special reference to

Cancer Cervix And Uterus

BY

K. R. DORAISWAMY, M.A.R.S.

Director, The Premier Radiological Institute and Cancer Hospital, Edward Elliots Road, Mylapore, Madras.

To begin with I will say "Cancer is curable." More people are being cured of this disease than is generally supposed. Patients who have been cured of cancer are reluctant to discuss it. Consequently we hear more of the failures than of the successes. If it is true that cancer is curable, why does not this happy event occur more often?

The last ten years, and more notably the last five years, have witnessed important advances in treatment and marked improvement in results in certain types of cancer. More powerful x-ray and radium apparatus and especially a better understanding of the basic principles by which these agents act upon cancerous tissues have revolutionised the technique of radiation and enhanced the possibilities of cure.

In general it may be said that for the early cancers, x-ray and radium in expert hands accomplish 80 to 90% cures and 10 to 20% in advanced cases. These are the triumphs of radiation of the past ten years and it represents the most painstaking efforts of closely co-ordinated and perfectly organized groups of scientists over a period of almost twenty years. Efforts to detect cancer in their early stages and researches into the fundamental causes with the hope of prevention constitutes important fields of cancer research.

Cancer research: Cancer research may be divided into two parts. 1. Clinical research. 2. Experimental research.

Clinical research or the investigation of cancer as it is seen in the patient, includes also laboratory research undertaken to solve practical problems in diagnosis and treatment. Examples of clinical research are statistical studies upon such questions as heredity, efforts to devise diagnostic test for early cancer and the development of principles and technique of application of x-ray and radium. This last type of research has fully proved its value by the practical contributions it has made to the curability of cancer.

Read before the Gynaecological and Obstetric Society of South India, Women and Children's Hospital, Egmore, Madras. *on 30th September* 1950

Experimental research is concerned with an investigation of the nature and underlying causes of cancer. Although we are in possession of considerable data relating to the contributing causes of cancer, the ultimate cause of this disease remains an unsolved mystery. This type of research, dealing as it does with the fundamental problems of causation, is wide in its scope. It necessarily extends into the domains of Physics, Chemistry and Biology. This type of basic research goes hand in hand with clinical and pathologic research.

Aims of a Cancer Institute: The functions of a cancer institute are separated into three divisions:—1. Treatment. 2. Education. 3. Research. Treatment includes diagnostic facilities.

Individual authorities and accredited organisations are in unanimous agreement that the most advanced form of cancer service is that provided by special cancer institutes where opportunity is provided for diagnosis, treatment and the collection of precise data. In such institutes, carefully controlled experimental trials of new methods and techniques are easily conducted and the results made available to the medical world. The treatment of cancer has therefore ceased to be the function of one individual but has become the work of a group consisting of a surgeon, an x-ray specialist, a radium specialist and a pathologist. It is the team work which has resulted in the organisation of special establishments dedicated to the treatment of cancer.

Education: Education involves dissemination of knowledge regarding various aspects of cancer among the general public, education of the general practitioner and the training of the cancer specialists.

Education of the Public: The dissemination of correct information regarding the early signs of cancer is the function of specially organised groups. In America this phase of cancer control is admirably cared for by the American Society for the Control of Cancer. The presence of a cancer institute serves as a centre for public attention and raises the level of knowledge of the population in the immediate and surrounding communities.

Education of the Physician: The general physician is the keystone to cancer control. A more thorough training of the medical students, increased attention to the subject in medical societies and frequent postgraduate courses in cancer are the available methods. A cancer institute is the centre for these activities. Now most of these institutes are established in the general hospitals.

3. *Research*:—See previous note on this subject.

Principles of organisation:—Three circumstances have combined to stimulate interest in special institutes: 1. Renewed interest and activity in the cancer problem. 2. Establishment of more cancer institutes efficiently planned and organised. 3. The availability of some of the recognised authorities to participate in this understanding.

The dominant spirit of such institutes is that all considerations be submerged in favour of the purpose of the organisation, namely unhampered and unrestricted opportunity for freedom of thought and action in all scientific endeavour. In order to accomplish this purpose the organisation is based upon the following principles:

1. The institute is thoroughly and completely equipped.
2. The organisation is perfect.
3. The staff of the institution is well chosen.
4. The growth of the institute is controlled by its scientific contributions and accomplishments.

Pathology and radiosensitivity: It is well known that rapidly growing, highly malignant tumours respond rapidly to radiation. It is equally well recognised that such tumours recur as promptly as they regress. What is the explanation for this curious phenomenon? Clinical and histological evidence clearly shows that extensive destruction of radiosensitive tumours may be accomplished by relatively small doses of radiation but unless complete sterilization of the tumour is effected the viable remnant of tumour is the element of recurrence. It would seem logical therefore to suppose that if the gross anatomic distribution of the tumour is such that uniform radiation, in sufficient quantity can be delivered, complete eradication of a radiosensitive tumour could be accomplished even when the disease is in its advanced stage.

The basis of histological classification which is adopted is the degree of anaplasia of the tumour. The histological signs of anaplasia are cellularity, variations in size and shape and nuclei, nuclear hyper-chromation, infiltrative tendencies, loss of polarity and absence of adult differentiated characters. Based upon these features the cases were divided into three groups: at one extreme there is a small group (17%) in which the tumour cells are highly differentiated, adult in character with definite squamous tendencies—Adult type—grade 1. At the other extreme there is a small group (21%) in which the tumor is highly cellular and anaplastic with complete loss of differentiation, diffuse infiltrative growth of small cells and numerous atypical mitoses—Anaplastic type—grade 3. Between these two extremes there is a larger intermediate group (62%) showing only partial differentiation and moderate anaplasia. This type commonly shows a plexiform arrangement—Plexiform type—grade 2.

According to the statistics on the results of treatment, it is evident that the stage of the disease alone is an important factor in prognosis. The cures effected in the early and border line cases are comparatively high regardless of the cell type. Also the prognosis in advanced cancer of the cervix under radiation therapy is extremely favourable in the anaplastic group.

It is of considerable interest to analyse briefly the factors which render this disease especially amenable to radiation treatment.

1. With more exceptions, cancer of the cervix remains localised for long periods without producing distant metastases. When the disease has become advanced and invaded the parametrium, the process is still local and not disseminated. This peculiar tendency of the disease to remain localised and confined to the parametrium undoubtedly accounts for the ability to cure the disease under certain conditions even in its advanced stages.

2. The anatomical conditions for radiation treatment are peculiarly favourable in cancer of the cervix. The lesion may be radiated from within the cervical canal, through the vagina, by direct implantation into the tumour and external radiation to the parametrium. Thus there are four means of attack from different sources each of which may be centred directly upon the lesion.

3. The most important reason for the successful results in the radiation treatment of cancer of the cervix is to be found in the histologic structure. When it is considered that 60-80% of cancer of the cervix are radiosensitive, it is obvious that this factor must play an important part in the favourable results of the radiation treatment of the disease.

Classification of the cancer cervix as per the League of Nations chart of 1938:—

The "A" group are those cases in which the disease is limited to the cervix with a freely movable uterus. The "B" group are those where the disease has gone into the uterine cavity or into the vaginal walls. The "C" group are those where there is beginning of involvement of the broad ligaments and the "D" group are those with wide fixation of the pelvis or those with remote metastases. The "A" and "B" groups are combined and called a favourable group.

The technique of radiation:—(a) The entire cycle of radiation must be executed during an optimum time interval which differs somewhat in different lesions. Unless the lesion is correctly treated and completely eradicated at the first attempt there is rarely a second opportunity.

(*b*) The dose that is delivered to a tumour must be adequate and with rare exceptions must approach but not reach the lethal dose of the surrounding normal tissues.

(*c*) In order to effect complete sterilization of the tumour, each component part of it must receive an adequate irradiation. Failure to effect an uniform and homogenous irradiation is the commonest cause of local recurrences.

(*d*) In order to obtain a selective effect upon tumour cells, the filtration must be adequate, as only in this manner is the tumour exposed to the most penetrating rays.

Radiation treatment of carcimoma of the cervix: (Treatment is adopted in the Bellevue Hospital, New York).

Here the x-ray therapy precedes radium treatment, because they are of the opinion that x-ray therapy is extremely effective in controlling pelvic involvement, reduces secondary infection, often appreciably reduces the local lesion and controls

bleeding. The period taken by the x-ray therapy also permits partial recuperation of the patient so that she will tolerate radium therapy better.

X-ray therapy is based on the following methods:—

Method I:—The rays are directed towards the parametria through 4 fields—two anterior and two posterior. The daily dose is 200-300 r in air for a field and two fields treated. 2000-2400 r is given to each portal with the following factors: 200 K.V., ½ Cu+1 Al. at 50 cms. distance, the size of the fields being 9×12, 10X15 or 20X20cms. In stout women two additional lateral fields are advised.

Method II:—The treatment is given through one large field anteriorly and posteriorly. The factors are the same as before and 200-300 r is given to each field on alternate days till 2000-3000 r is given to each field. This is applicable to thin women only.

Method III:—The therapy is administered by the protective method, i.e., 4 to 12 fields are selected over the pelvis. Long target skin distance and heavy filtration are used but the treatment extends over a long period (20 to 30 days). Treatment is given to 2 portals a day until 2000-3000 r is administered to each portal. This method is useful in advanced cases.

Method IV:—This is a different kind of treatment altogether and consists of applying treatment to the pelvis through a radium pack or bomb. This is possible only if 4-5 grams of radium is available. The dose is 5000-10,000 mgm. hrs. per treatment to each of 2 anterior and 2 posterior fields until 30,000-50,000 mgm. hrs. are administered. The distance being 6-8 cms. and filtration 2 mm. Pl.

Method V:—This is the intravaginal application of x-rays through a cone. For this the vagina must be large to admit the cone. This is not possible in the advanced cases or in the atresic type of vagina. Dosage ranges from 3000-4000 r directly administered to the cervix through a cone of 2-3 cms. diameter. The daily dose being 200-300 r with 200 K. V., ½ Cu plus 1 Al. at 50 cms. distance.

Arneson and Quimby who studied the distribution of external irradiation, using various techniques have come to the conclusion that with 200 K.V., 0.5 Cu plus 1 Al. the best parametrial dosage and distribution would be obtained by selecting six portals—two anterior, two posterior and two lateral of 10 × 15 cms. at a distance of 70 cms. In a pelvis of 25 cms. A.P. and 35 cms. transverse, the percentage depth dose was found to be 70—80% at the cervix, 80—90% at the parametria and 60—80% at the bladder and rectum.

Radium Technique:—Radium is applied as soon as the x-ray therapy is completed. Either radium or radon is used.

The method of application depends on:

1. The clinical type of the lesion.

2. The amount of cervical involvement.
3. The degree of extension to surrounding parts.
4. Whether or not a previous hysterectomy has been done.

The method of radium therapy called the Bellevue method is just a modified method of that used in Curie Institute in Paris.

The radium applicator used for the uterus is a rubber sound of 3 mm. thickness. Depending on the length of the uterus one or more radium capsules are used so that the whole canal will be irradiated. The nature of extension into the uterine canal from the cervix determines the dose required. The radium tubes are 5—15 mgms. each with a filtration of 1.0—1.5 mm. Pl.

To the cervix a colpostat is applied. This is also a modified Curie colpostat. It is a rubber device with 3 corks into which are placed the radium tubes of 10—25 mgms. with a filtration 1.0—1.5 mm. Pl. These radium tubes are enclosed in extra gold or platinum tubes to give a total filtration of 2—2.5 mm. Pl. Two or more corks are used, the number depending on the nature of the lesion and width of the vagina. The heavy filtration and the distance obtained by correct placement and proper packing reduces the possibility of radium necrosis nearest the applicator and permits intense irradiation of the underlying tissues by the Gamma ray, the caustic radiation being removed by the thick filtration.

A number of other metallic applicators are in use but the most popular is the rubber colpostat as it is more efficient and economical.

Dosage: This varies between 5000—8000 mgm. hrs. depending upon the nature of the lesion. The dose in the vagina varies from 2000—4500 mgm. hrs. with the safe limit not over 4500 mgm. hrs. A dose of about 9000 mgm. hrs. can be given to the uterus if properly applied.

In Group I a dose of about 5000 mgm. hrs. to the cervix and uterus is sufficient to heal the lesion. In group II and III about 8000 mgm. hrs. may be required while in Group IV only pallative measures are possible and the dose rarely exceeds 5000 mgm. hrs.

Radium distribution in Gr. I cases.

Uterus—Sound 3 tubes

10 10 5 —25

Vagina—Colpostat 3 corks

10 10 10 —30

—

55 mgms.

Total dose 5060 mgm. hrs. delivered in 92 hrs. Uterus receives 2300 mgm. hrs. and vagina 2760 mgm. hrs. In the sound the 5 mgm. tube is placed at the external cervical os because additional cross fire irradiation is obtained from the middle cork of the colpostat.

Gr. II and III cases require larger doses.

Uterus—Sound 3 tubes

10 10 10 —30

Vagina—Colpostat 3 corks

15 15 15 —45

—

75 mgms.

This is left in place for 107 hrs. giving a total dose of 8025 mgm. hrs.—uterus 3210 and vagina 4815 mgm. hrs.

Recurrences:—Radium may be applied again. If the recurrence is a small ulceration or granulation-like growth on the cervix, it may be treated by applying a cork or colpostat containing radium up against the lesion or small gold filtered radon seeds may be inserted. If there is a recurrence in the intra-cervical canal, a sound can be introduced as in the original method. If recurrence appears in the vagina, radium needles are inserted in and around the lesion or contact radium therapy given with rubber covered tubes held against the lesion by gauze or wax mould fitted into the vagina. Sometimes intra-vaginal x-ray therapy is given.

Bulky cervical tumour:—When the cervix shows a large, fungating or cauliflower type the mass is first removed preferably with an endothermic knife, before radium is applied. As the cervical uterine canal is shortened by this procedure, a stouter uterine sound will have to be used. Following amputation of the cervix a small amount of iodoform gauze is placed against the cut surface of the cervix stump to prevent haemorrhage which may occasionally follow. The radium colpostat applicators are then placed in the usual fashion, pressed firmly against the stump and held in position by the iodoform gauze vaginal packing.

Uterus	Sound	2 tubes		
10	10	0	—20	
Vagina	Colpostat			
10	10	10	—30	
				50 mgms.

This is left in place for 120 hrs. to give total dose of 6000 mgm. hrs.—2400 mgm. hrs. to the uterus and 3600 mgm. hrs. to the vagina.

Unusual forms of cervical cancer:—In those cases where the uterine canal cannot be located, the radium is placed in the vagina for several days until the local mass has receded and the canal visualised. Then the uterine sound is inserted and the required dose given. In some cases where the mass is bulky and obstructs the vagina and cervical canal, as much of the mass is removed surgically and then the radium is applied. If following excision the canal is visualised radium is inserted at once; if not the vaginal radium applicator is placed against the remaining mass and in a few days when this has receded and the cervical canal be visualised, the sound is inserted.

In advanced cases radium is used only to control bleeding of the local lesion, in the form of a vaginal applicator.

Vaginal wall lesion may be treated by insertion of radon seeds or radium needles. At the same time the radium is applied to the cervix and the uterus to control the primary lesion. In some cases the vaginal lesion may be treated with a mould containing radium tubes, the dose given depending upon the size and extent of the lesion.

In cases where the vagina is small and narrow and does not permit the 3 cork technique, two corks are used and the amount of radium in the corks is so adjusted as to give the

required dose.

Uterus	Sound 3 tubes			
	10	10	15	—35
Vagina	Colpostat 2 corks			
	15	0	15	—30
				—
				65 mgms.
				—

The five year survival rate in the United States is approximately as follows:—

86% in stage I.

43% in stage I, II & III put together.

The over all survival rate in the Bellevue hospital is 33.1% for all stages put together.

Cancer of the Uterine fundus:—Except in advanced cases, surgical treatment is the method of preference. Total hysterectomy has been the method employed.

Contrary to previous opinion, the present view is that all grades of uterine cancers are responsive to irradiation. Though the irradiation method is replacing surgery very rapidly, still some are of the view that preoperative irradiation followed by surgery is the treatment of choice as the preoperative irradiation also controls the high grade malignancy.

As in the case of cervix, here also x-ray therapy is given before radium treatment. The factors are 200 K. V, 0.5 to 1 mm. Cu and 1 mm. Al. 50 cms. distance and 9×12 to 10×15 cms. portals. Two anterior fields and two posterior fields, the beams to be directed to the lesion. Each field gets a skin dose of 1500-2000 r. When the general condition is poor supportive treatment is carried out.

Radium technique:—1. Multiple sounds: The multiple uterine sounds consist of several small rubber sacs in which are placed the radium tubes of 5-10 mgms. with a filtration of 1.5-2.0 mm. Pl. When placed in the rubber sacs the open ends are tied with silk. The threads are kept long so that when the tubes are inserted, the sacs may again be removed when the treatment is over. Along with these rubber sounds the usual rubber tandem is also inserted. This contains about one to four radium tubes of 10.25 mgms. each with a filtration of 1.5 to 2 mm. Pl. The radium is left in place to give 3000-8000 mgm. hrs. depending upon the extent of the lesion. When placing multiple sounds, they are inserted one at a time and placed against the top of the fundal cavity—towards the base and distributed as evenly as possible. The threads attached to the sounds are brought out through the cervical canal. Then the regular uterine sound is inserted. The vagina is carefully packed with iodoform gauze to keep the radium in place.

Five year survival rate is as follows:

Surgery alone 36-63%
Irradiation alone 37-50%
Surgery plus irradiation 55-82%.

The Paris technique:—This is carried out with 6 radium tubes, 4 of which contain 13.33 mgms. and 2, 6.66 mgms. of radium. The filtration is 1.5 mm. Pl. in the uterine cavity and 2 mm. Pl. in the vagina. For intra-uterine use 3 tubes are placed in a thin rubber sheath forming an applicator 6.8 cms. long and

8 mm. thick. The applicator for the vaginal use is a colpostat and consists of two rubber cylinders connected by an elastic spring of 10-15 cms. in length. Each of the rubber cylinders holds radium tube of 13.33 mgms. The cork cylinders have a diameter of 2 cms. and a length of 3 cms. When the cork cylinders are introduced into the lateral fornices, there will be space between the tumour and the spring of the colpostat for an additional cork or two containing radium. The average treatment time is 5 days when a total dose of 8000-9000 mgm. hrs. is reached. Every morning the dressing is changed and the tubes are disinfected and reinserted after a douche. As a rule the dose is distributed so that the patients receive an intra-uterine dose of 4000 mgm. hrs. and an equal amount in the vagina, the total amount of radium being 66.66 mgms.

The essential difference of this method from that used in Stockholm is the total period of radiation at one sitting. The total dose in both methods is about the same, at any rate, there is no fundamental difference.

The radium treatment is combined with external x-radiation or radium teletherapy.

The Stockholm technique:—This method used at the Radiumhemmet at Stockholm comprises fractional irradiation protracted over a period of 4 weeks. The intra-uterine and vaginal treatment are usually given simultaneously. The intra-uterine applicators containing 50-70 mgms. of radium are used, the length of the applicator and the radium content vary according to the length of the uterine canal, the diameter corresponds to No. 7 or 8 Hegar's dilator. For vaginal application, the radium tubes are placed in flat applicators which vary in size and shape. They contain as a rule 70-75 mgms. of radium.

In order to distend the vault of the vagina laterally and place the radium applicators as close as possible to the parametria and the lateral pelvic walls, blocks of glass or vulcanite are used to separate the individual vaginal applicators. The radium applicators accurately introduced, are kept in place by plugging the vagina with gauze; the plugging is so arranged that the radium is at the greatest distance possible from the rectum.

The filtration of the radium is equivalent to 1.5 to 2 mm. Pl.

In the original technique 3 treatments of 25 to 30 hrs. were given. Recently only two treatments are given each of 20-24 hrs. at an interval of 3 weeks. The x-ray treatment is given only after the second radium treatment.

There are certain modifications in the above technique and instead of a combined intra-uterine and vaginal method, the former is given alone if the cervical canal is accessible or the latter alone when the canal is occluded. These are used where the standard method would involve serious risks, i.e., where serious infection may develop. To diminish the risk of infection, the quantity of radium used is greatly increased and the treatment time reduced. The uterine applicators may contain as many as 7×50 mgms. tubes. The vaginal applicator called the micro bombs contain 4×50 mgms tubes and the

other up to 7×50 mgs. tubes.

The Manchester Technique:—This is a modification of the Paris method. The treatment is divided into 2 fractions and if x-ray therapy is employed this is given in the interval between the 2 sittings. A special dosage system is employed which enables a predetermined dose of irradiation to be given to a selected point in the pelvis (point 'A' in the para-cervical triangle).

Rubber ovoids are used instead of the corks and the shape of the ovoids follows the isodose surface of the radium source contained within it. Three sizes are available (small, medium and large) and are used in pairs separated by a spacer 1 cm. thick or if the vault is narrow, a washer is employed which allows the ovoids to be almost in contact.

Rubber tandem is used for the intra-uterine sources. Three lengths are available (short, medium and long).

In order to get the desired dosage a unit system is employed and the applicators are loaded with a variable number of radium units depending on the size of the ovoids and the length of the intra-uterine tube. The radium unit is 6.66 mgms. tube—1.5 cm. active length and 1 mm. Pl. filter. The spacing and duration of the radium treatment vary. In stage I or II treatment is exclusively by radium; the first treatment is given over a period of 2—4 days and the second of similar duration follows after 4 to 7 days. In stages III & IV where supplementary x-ray therapy is employed, the interval between treatments is extended to 1 month during which time the x-ray therapy is given.

Radium distribution:			
Vagina ovoids in pairs:	Large	.. ..	5 units each
	Medium	.. ..	4 units each
	Small	.. ..	3 units each
Uterine tubes:	Long	.. ..	2 units: 2 units: 1 unit
	Medium	.. ..	2 units: 1 unit
	Short	.. ..	2 units

Summary of doses:

Treatment by radium: Radium 3500-4000 r at A in 2-4 days. Rest 4-7 days. Radium 3500-4000 r at A in 2-4 days.	For stages I & II.
Treatment by radium and x-rays: Radium 3000-3500 r at A in 2-4 days. X-ray (24 exposures) 3000 r at parametria. Radium 3000-3500 r at A in 2 days.	For stages III & IV

X-rays are worthless if given weeks or months after the radium applications as no summation of dosage occurs.

Basis of dosage assessment:

As the method is intra-cavitary, the intensity cannot be homogenous

but falls from the centre outwards and it becomes advisable to assess the dose at a key point. The point called 'A' selected for this purpose is in the paracervical triangle and all dosage is prescribed in terms of the "dose at point A."

Point 'A' is defined as lying 2 cms. lateral to the central canal of the uterus and 2 cms. above the mucous membrane of the lateral fornix. Just to know the rate of fall external to point 'A,' a secondary point 'B' is selected and this is situated at 3 cms. from point 'A' on the same plane and denotes the position of the obturator node. Other points are the surface of the mucous membrane of the rectum and bladder. The dose delivered to point 'A' should not be less than 7000 r and seldom more than 8000 r for an overall time of exposure of from 10-17 days. If the available unit is the 6.66 mgms. tube, a dose of 8000 r is delivered in 2 applications of 72 hrs. each with an interval of 4 days between.

Treatment is designed to deliver a pre-calculated dose at point 'A.' To determine this a knowledge of tissue tolerance is necessary. Approximate relative tolerance levels on a basis of 8 days continuous irradiation is as follows:

Dose at point A	8000 r
Wall of uterus	30000 r
Vaginal mucosa (vault)	20000 r
Recto-vaginal septum	6000 r

The total dose is based on the dose delivered to point 'A.' This point is selected because there seems to be good evidence that high dose effect in the para-cervical tissues in this region where the uterine vessels are crossed by the ureter, produce the dangerous "extrinsic rectal irritation." The probability of parametrial spread demands that full advantage be taken of the distensibility of the vagina to arrange the sources of gamma radiation to throw the radiation as far laterally as possible without increasing that received in the paracervical triangle at point 'A'. It is also necessary that the dose be kept as low as possible on the vulnerable structures like the rectum and bladder.

X-ray therapy:—The treatment is designed to irradiate the parametria while protecting the strip between the two points 'A.' So a lead strip is placed to cut off the radiation both anteriorly and posteriorily. The result is equivalent to four small fields, two anteriorly and two posteriorly. In addition 4 small lateral fields are selected, and beams are directed, at 60 degrees for the anterior oblique fields and at 80 degrees for the posterior oblique fields.

In conclusion, most of the complications of the radiotherapy of cancer of the cervix can be avoided by observing the correct techniques and taking necessary precautions. For want of time I am not going into the complications one by one.

And finally I would like to touch upon the subject of Electroendothermy as an adjuvant to radiotherapy in uterine cancer. This treatment is mostly used at the Radiumhemmet in Stockholm.

Electro-endothermy, carefully performed as fulguration is a valuable adjunct in the radiological treatment of uterine cancer and is generally

a technically simple and harmless method of treatment.

It is useful particularly in cancer of the collum where radiotherapy has failed whether it is a case of tumour remnant or of a local recurrence in a primarily cured case. In cases of this type which are inoperable because of the extent of the growth, electro-endothermy is the only remaining method of treatment. Definite cure might be obtained but only in case of a superficial cancer or of isolated metastases in the vagina. Cases that are inoperable or of poor surgical risks because of some complicating disease such as old age, obesity and heart failure, might be treated by this method. In operable cases we have the choice between electro-endothermy and laparotomy. The former has the following advantages: (a) Electro-endothermy is more harmless and has no primary mortality. (b) In cases which at laparotomy would prove to be inoperable because of metastases, the patient is saved from an unnecessary intervention and from the mental shock of the knowledge that nothing can be done. (c) Electro-endothermy is an especially valuable method of treatment in cases in which it is impossible to differentiate between a recurrence and radium necrosis. By a simple and harmless fulguration it is possible to avoid in such cases the discomfort and risk of a major operation and at the same time a therapeutic effect can be achieved.

References.

1. Cade, Sir Stafford: Malignant Disease and its Treatment by Radium, Vol. III, 1950.
2. Kaplan, L. L.: Clinical Radiation Therapy, second edition, 1949.
3. Patterson, R.: The Treatment of Malignant Disease by Radium and X-Rays, 1949.