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Indian Journal of Radiology

May 1947

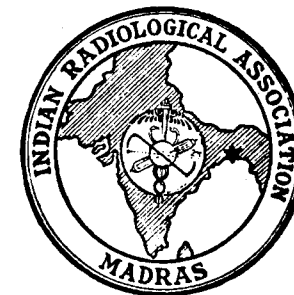


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The Indian Journal of Radiology

A quarterly Journal
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VOLUME 1

MAY 1947

No. 2

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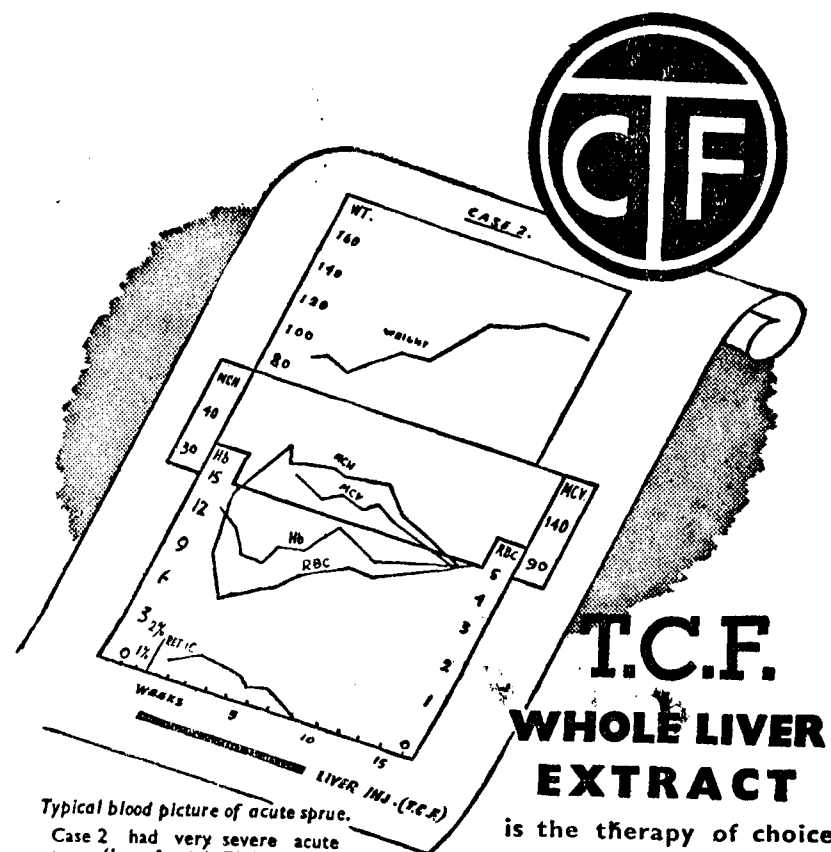
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THE INDIAN JOURNAL OF RADIOLOGY

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May 1947

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NOTICE

It is now decided that the Second Indian Congress of Radiology will be held at Bombay during the last week of December 1947—dates 24-29th.

Members are requested to note these dates and send titles of their papers at an early date and plan their X'mas in such a manner as to be able to attend the Congress and the meetings.

Further details will be announced in the August 1947 issue of the journal.

THE INDIAN JOURNAL OF RADIOLOGY

Owned and Published as its Official Organ by
(The Indian Radiological Association)

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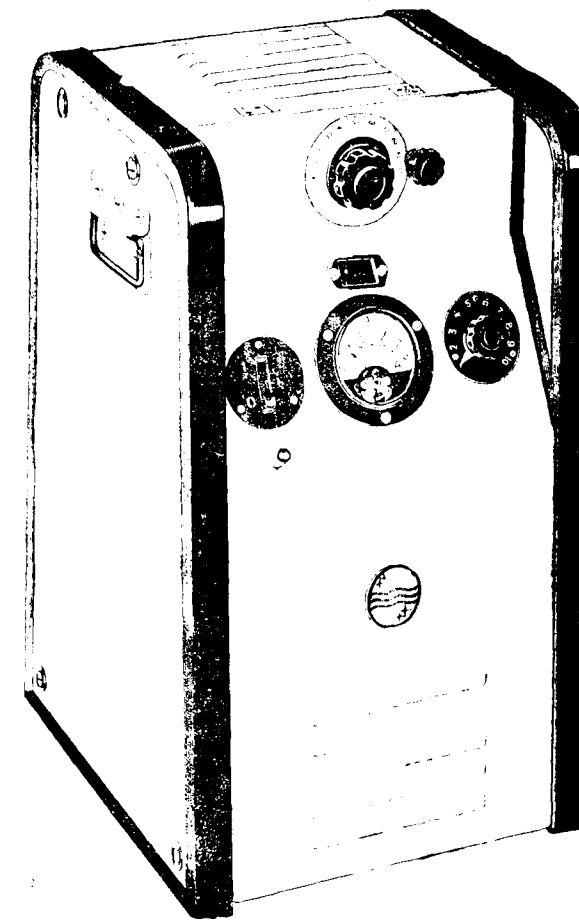
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The Indian Journal of Radiology

Vol. I.

MAY, 1947

No. 2.

Treatment of Leucoderma and the Technique Employed

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PROFESSOR OF RADIOLOGY, THE BARNARD INSTITUTE OF RADIOLOGY,
GOVERNMENT GENERAL HOSPITAL, MADRAS.

OVER six years ago I was confronted with a difficult case; it was a young man of about 20 years—a relation of one of my colleagues in the General Hospital rather ill-nourished and confined to bed. The illness was diagnosed variously by the several doctors who had seen him earlier. He had both allopathic and indigenous system of treatment with no benefit. My colleague admitted him in our hospital and after full investigation came to the conclusion that there was nothing organically wrong with this patient and that all his troubles were psychological due to the very extensive leucoderma patches he was having. The clinical photograph of the legs taken before treatment show the extent of the lesions. He was treated with Super-

ficial X-ray therapy at 100 k.v., 0.5 mm. Al. filter. The second set of clinical photographs show the condition of the legs after treatment. You will see their progressive improvement even after stopping the treatment. These are marked No. 1, 2 and 3 (*vide page 46*). With the improvement of the lesion his general condition also improved and he has remained well all these years. He was able to prosecute his studies further and is now employed in a responsible and gainful occupation.

Although this line of treatment proved very successful in all the dozen cases treated, it was felt that it was not a fool-proof method to be used in a large institution like ours and also it would not be suitable to treat very large areas. This made

me look to some other agent in the family of electro-magnetic radiations which, while producing the desired effect of a persistent erythema will not be harmful to the system and can be employed with perfect safety in the treatment of a large number of cases where daily personal supervision would be very difficult. My choice naturally fell on the Ultra-

pigment forming cells to resume their normal duties and that the Ultra-violet radiations would be rather the ideal thing if a suitable technique could be worked out. It took some time to work out the technique and now we have a technique which when employed in suitably selected cases has given us a curative rate of above 90% of all the cases treated so far.



FIG. 1
Before treatment.

FIG. 2
On cessation of treatment.

FIG. 3
Ex. 10 months after
cessation of treatment.

violet ray radiations either the air cooled mercury vapour lamp for large lesions or the water cooled Kromayer lamp for small lesions—since it struck me that all these electro-magnetic radiations belong to the same family the only difference between them being their degree of penetration and the quantum of energy they carry. In this condition we do not need a highly penetrating radiation to influence the

Selection of cases. (1) Exclude cases due to specific disease by serological examination, if necessary after a provocative dose of one of the arsenical preparations; (2) exclude cases which have been already treated with powerful counter irritants applied locally and have failed to respond to such treatment. The usual irritants are Silver Nitrate, certain vegetable roots, intradermal bouchi

oil etc. It is my experience that when these agents have been used and have failed, they leave rather a leathery type of skin which do not respond to this line of treatment. The skin subjected to such local treatments loses its suppleness and the fineness of its texture.

Technique of treatment. (1) If there are no contra-indications, these patients are given 0.01 gramme of Myocrysin or any other suitable gold preparation parenterally once a week or 10 days—a maximum of 10 such injections. (2) The lesions are exposed to Ultra-violet radiations and the dose is gradually worked up to a point when a persistent mild erythema over the white spots appears. This stage of the reaction is maintained day after day when one of two things will happen either: (1) a number of small islands of natural pigments appear scattered here and there on the depigmented areas and begin to grow slowly and coalesce or (2) the natural pigment begins to creep in from the periphery of the lesion and cover the depigmented areas. This stage is usually reached in about 8 to 12 weeks when the treatment is discontinued. There after this process of re-pigmentation goes on without any further treatment until the whole lesion is completely re-pigmented or after progressing to a certain extent it may stop. If this latter happens further treatment is

indicated. (3) In my recent series of cases I have used 15% oil of Bergoment in rectified spirit as an external application before exposure to Ultra-violet rays. This appears to hasten the advent of the erythematous reaction, thus shortening the course of treatment to a certain extent and hence can be considered as a useful adjunct to the treatment.

Now I shall demonstrate to you two of my patients one treated in 1941 and the other who is now undergoing treatment. Both these patients had very extensive lesions, depigmented practically from head to feet. You can see here Mr. D. J. who was treated as far back as 5 years, to what a remarkable degree he has recovered with only one course of treatment in 1941. See photographs 6, 7, 8, 9, 10 and 11 (vide page 48). All these extensive areas have recovered their pigment and you can satisfy yourself that there is no difference between the texture or depth of colour of the areas that were treated and the surrounding areas. Further the pigment has remained permanent over these five years. The only area that has not recovered are the lips. The second patient Mr. H. D., a Mohamedan aged 60 years hails from Kathiawar had also very extensive lesions. His whole scalp, back and front of the chest, both upper extremities, some portions of the front of the thighs and legs were all

Ultra-Violet Ray Therapy



FIG. 6

FIG. 7
Before treatment.

FIG. 8



FIG. 9

FIG. 10
After treatment

FIG. 11

depigmented. You will see to what a remarkable extent he has recovered after two courses of treatment. The actual process of repigmentation—the islands of pigments etc., can be seen scattered all over the depigmented patches. Here are two slides for your examination and microphotograph of sections of the skin taken from this patient—one from an un-



FIG. 4

Section not yet responded to treatment.

healed depigmented portion and one from its immediate neighbourhood where satisfactory pigment has formed. These are marked 4 and 5. You see here that the first section No. 4 does not reveal the presence of any pigment forming cells whereas the second section No. 5 shows an abundance of pigment cells. I hope I have conclusively proved the usefulness of this line of treatment and that there is no necessity to turn back these unfortunate patients in a fit of despondency and despair.

Summary.—A total of 198 cases of Leucoderma varying in size from small patches to very extensive areas have been treated during the last 6 years. The first dozen cases were treated by Superficial X-ray therapy.

and all the rest of the cases have been treated by Ultra-violet ray therapy. The success rate has been over 90% in these cases. In these series of cases it has been observed, that the lips, the tips of fingers, and palm are the most difficult parts to treat. These take considerably longer time for repigmentation. The lips are the most delicate and any little error in the judgment of the dose, gives a blister which retards the progress of the treatment.

Discussion: Several members took part in the discussion that followed and the following observations were made

It was undesirable and positively harmful to expose large areas of the skin to superficial X-ray for purposes of producing persistent erythema in



5

FIG. 5

Section which has responded to treatment.

the basal layer of the skin, on account of the late changes that would inevitably occur as after-effects of irradiation.

That for localised patches of leucoderma Ultra-violet with quartz compression electrode as in the Kromayer lamp would help in producing erythema in the basal layer of the skin on account of the dehaematisation produced by the pressure, but for generalised patches, it was doubtful whether persistent erythema could be maintained without producing desquamation of the skin. Grenz rays give good results too.

Dr. Rai in his reply said that per-

sistent erythema with general Ultra-violet baths can be maintained in the basal layers of the skin without producing desquamation and that he had treated only the first (six) cases in this series with superficial X-ray's and had given up this method owing to the obvious dangers particularly so when large numbers of patients have to be dealt with in a public institution like the Barnard Institute of Radiology. All the rest of the cases in this series were treated either with general Ultra-violet Ray body bath when the areas involved were large or with Kromayer cold Quartz when the patches were small.

Short Wave Therapy of Pleurisy with Effusion

CAPTAIN RAM SINGH, M.B., B.S. (Pb.), D.M.R. (Madras),

IN-CHARGE, PRINCESS SURRENDRA KUMARI MEMORIAL CENTRAL ROENTGEN INSTITUTE, PATIALA.

Introductory.—Pleurisy with effusion cases are treated with repeated aspirations or aspiration and replacement of fluid with air along with other medicinal aids. It occurred that could not there be a method equally, if not more effective and safer than these? The physical medicine came to the rescue. The reports and the scanty work of the previous workers in this field as was available in this part of the country encouraged me to take up these investigations which were carried on from 1936 to 1941 at this Institute.

It is aimed that these investigations will provide food for thought to further research in this direction and to put the short wave treatment of pleurisy on sound and scientific footing and to expel the doubts of the skeptic minds who hesitate to practice or prescribe it.

Mode of action of short wave.—Briefly speaking the action of short waves is due to the action of heat. It acts by heating the tissues and causing active hyperaemia—thus removing the inflammation of the tissue cells and the deleterious meta-

bolic products. It improves the physiologic well being and promotes physical recovery. These produce active hyperaemia of a different type than produced by ordinary heat. The vaso-dilatation caused by the short waves cannot be influenced by Adrenalin and lasts many hours thus affords greater time for heating effect and phagocytosis (which it stimulates) to act. Many bio-physical changes occur as a result of the heating of the tissues in the condenser electric field. There is the increased permeability due to changes in the cell membranes resulting in increased absorption of fluid and this is further helped by the changes in the capillary and intra cellular valves. The inhibition of bacteria or their toxins, antitoxins and antigens are produced and thus occurs a process of true auto-inoculation or auto-vaccination.

Besides the action of heat some workers believe that *short waves have some 'specific' action too.*

The Apparatus and the technique used.—In these investigations Siemens 'Ultratherm' of a fixed 6 meter wave length and an output of 350 watts was used.

To begin with, the patient is assured that the treatment is not going to do any harm or cause any pain (if there is one, it will be relieved). In nervous patients non-harmful nature of the technique is readily

shown by showing another case being treated.

The patient treated is also informed in clear unambiguous words that he should only feel a pleasant sensation of warmth in the body and on the skin.

The patient is further advised to breathe quietly so that electrodes applied over the chest are not moving apart thus causing great variations in tuning.

Patient is treated with a cotton shirt which is good for aesthetic purposes and also acts as an absorbent of perspiration. No metallic articles are permitted to be worn on the area under treatment, if any present it acts as an aerial and thus cause concentration of waves at one point with the resultant burn.

The patient is treated while sitting on a armless wooden chair and if too ill to sit, is treated in lying position. Keeping in view the principle that the efficiency of the treatment is maximum when a normal area around the diseased one is also included in the field, the bigger 170 mm. Schilephake's glass shoe electrodes were used as a general routine. These also gave the bigger electrode skin distance. Either in case of children or when the field of treatment was smaller or when the bigger electrodes were not available smaller electrodes of 130 mm. were used. In cases of patients

treated in lying position or whenever glass electrodes were not available the rubber electrodes were used. The glass electrodes were preferred—being easy to apply and convenient to cleanse. The electrodes were applied antero-posteriorly on the affected side of chest and as far as practicable were kept parallel to each other. The maximum air spacing was used throughout these treatments, i.e., about 4 c.m. between the skin and the electrode. In case of rubber electrodes the proper skin distance was made up by using perforated felt pads in between the chest wall and the electrode. Great care is taken that the cables may not touch the patient and where there is any such likelihood, these were separated by felt pads from the body so that a burn may be avoided at the site of contact.

Having arranged the patient and the electrodes and made the necessary connections with the mains (having earth connection) the operating switch is turned to on-position. The current flows into the condenser field i.e., patient circuit. The filament heating knob is then slowly turned to the right until the voltmeter "V" reads 18.5—21 V.

Finally, the apparatus is tuned. The tuning is the most important item in the technique and is adjusted carefully. It is the adjustment of the capacity or inductance in the

patient's circuit to that of oscillating circuit of the apparatus i.e., the two are oscillating in unison. It is done by rotating the 'Tuning' knob to the right or left till the resonance indicator "J" needle shows the maximum deflection towards the right. The patient's circuit at this point is said to be in tune or unison with the generator circuit i.e., it is oscillating with the same frequency as the machine circuit and thus the apparatus is working at its maximum efficiency or output. It is further checked and controlled by the neon tube, which is either held in a special holder or in hand and with its other end the off-side of the condenser is touched. If the energy in the condenser field is enough it shows by intense fluorescence; and furthermore, if the intensity of fluorescence is equal on both electrodes then the energy is flowing equally through both electrodes. If there is less fluorescence at one electrode than the other then it can be equalled to the other by turning the tuning knob a little to the right or left while noting the fluorescence in the neon tube. The homogenous bright fluorescence on both condenser plates indicates that the voltage energy is equally distributed in good amount in the condenser field of the patient. Neon tube test has another advantage—its psychological effect. The patient, before using the neon tube having been explained its

significance, by seeing the beautiful fluorescence instead of any fear gets a buoying feeling and this raises his creative energies. The treatment is finished by turning the operating switch to zero or off position.

During the treatment besides watching the swing of the tuning indicator for resonance which is also tested from time to time by neon tube the patient is frequently questioned about the sensation of pleasant warmth. If it is otherwise i.e., if there is any sensation of pain, it is mostly due to perspiration drops, but may be due to decreased skin electrode distance. If due to perspiration drops which especially occurs in the hot season, then the wet portion of the shirt is drawn up to replace it by a dry one. To avoid perspiration during the hot summer months of the Punjab the treatment is generally given in the early hours of the morning and under a low speed electric ceiling fan. If due to decreased electrode skin distance then it is also corrected.

Dosage.—Up to the present day the dose measurement is empirical in short wave therapy (recently a dosimeter has been introduced in some apparatuses). The dose (as already stated) is regulated by the skin sen-

sation of the patient and the standard skin sensation recognised is the pleasant sensation of warmth felt by the patient. The first sitting or treatment given is of 10 minutes duration in order to find out the reaction of the individual treated. The second treatment is of 15–20 minutes and then the rest of the treatments are of 20 minutes duration. In these series the sittings were given daily except on Sundays. In acute cases, 10 minute sittings were continued until the acute symptoms subsided and then the sitting was increased gradually to 15–20 minutes. In chronic cases 20 minutes exposure were usually given but in chronic cases of long standing the time was increased to 30 minutes.

Diagnosis.—In this series the diagnosis was based on clinical and radiological examinations in all cases and in most of the cases by exploratory pleural puncture and laboratory examinations of the fluid. No guinea-pig inoculation or culture for mycobacterium tuberculosis was done. Cases having positive sputum for mycobacterium tuberculosis were not treated. The progress of the cases had been controlled clinically and radiologically.

Cases of Pleurisy with Effusion Treated by Short Wave Therapy from 1936 to 1941.

S. No.	Name	Age and sex	In or out-patient	Previous ill-health in months	Side treated	Level of fluid	No. of sittings given	Result	Remarks
1	H. D.	20 F	O	1	L	+++	18	C	Pregnant 5 months.
2	M. R. D.*	26 F	O	3	R	++	14	C	
3	P. R.	28 M	O	2½	L	++	15	C	
4	J.	19 F	O	1½	L	++	12	C	
5	H. S.	28 M	O	2	L	++	20	C	Left apical productive tuberculosis lesion to begin with. Developed tuberculosis left lung two years after treatment. Died one year later.
6	J. D.	35 M	O	1	L	++	20	C	Traumatic pleurisy after rib fracture.
7	M. R.	45 M	O	½	L	+	10	C	
8	K. K.*	13 F	O	6	L	+++	32	C	
9	K. A. S.	16 M	O	2½	L	++	11	C	Calcium and aspiration of fluid tried before short wave treatment. Developed productive tuberculosis left lung 3 years after treatment, cured. Living.
					R	++		C	To begin pleurisy on left only. Treated on the left side and during treatment developed on the right. After 7 treatments gave up for 15 days. Tried other treatments. Finding no relief started treatment on the right again and got cured.
					R	++		C	Tuberculin and calcium treatment tried before short wave treatment. Two years later developed tuberculosis and died.
10	C.	1 F	O	5	R	++	20	C	Pleurisy after pneumonia.
11	S.	20 M	I	2	L	++	17	C	Foot servant. Worked during treatments. No other treatment given.
12	K. R.	15 M	O	8	R	++++	36	C	Developed tuberculosis right side two years later, cured. Living.
13	M. S.	27 M	O	2½	R	++	12	C	

Cases of Pleurisy with Effusion Treated by Short Wave Therapy from 1936 to 1941—Contd.

S. No.	Name	Age and sex	In or out-patient	Previous ill-health in months	Side treated	Level of fluid	No. of sittings given	Results	Remarks
14	B. R.	40 M	O	4	R	++	23	C	Developed pulmonary tuberculosis right side six years after. Cured and living.
15	D. R.	12 M	O	2	R	+++	29	C	Developed productive tuberculosis after 7 years, cured, living.
16	M. H. S.	19 F	O	4	L	++++±	38	C	
17	M. B.	23 F	O	2	L	++	18	C	300 cc of fluid aspirated before starting short wave treatment.
18	Z. A.	20 M	O	5	R	++++±	34	C	
19	V.*	13 M	O	2	R	++	29	C	
20	N. L.	22 M	I	1½	L	+++	14	C	Illustrated in text. Acute case with high temperature. First developed pleurisy on left side. During treatment developed pleurisy on the right side. Both sides cured. Enjoying good health.
					R	++		C	
21	K. D.	25 F	O	2	R	++	16	C	A tuberculous contact. Temperature came normal during treatment but no change in fluid level occurred. During treatment she was given 10 injections of Entodon in the Ward. Later on developed tuberculosis and died.
22	S.	16 F	I	8	L	++++	45	F	
23	J. K.	27 F	O	3	L	+++	20	C	Developed bilateral productive tuberculosis two years after treatment, cured. Living.
24	S.	10 F C	O	½	L	++++±	26	C	Got productive tuberculosis left lung, 5 years after treatment, cured. Living.
25	H. A.	15 M	I	1	R	++++±	28	C	5 months pregnant.
26	J.	28 F	O	3	L	++	15	C	
27	N. K.	14 F	O	1½	L	++	16	C	Developed tuberculosis one year after. Cured, living.
28	R. A.	23 M	O	1½	L	+++	24	C	

Cases of Pleurisy with Effusion Treated by Short Wave Therapy from 1936 to 1941—Contd.

S. No.	Name	Age and sex	In or out-patient	Previous ill. health in months	Side treated	Level of fluid	No. of sittings given	Result	Remarks
29	M.	16 F	I	2	R	+++	25	C	Case discussed in the text.
30	A. H.	18 M	I	2	L	++	46	F	
31	B. R.	22 M	I	4	L	++	18	C	
32	K. I. S.	20 M	O	4½	L	++	15	C	Two years before the present trouble suffered from tuberculosis of the lung. Cured at Dharampore Sanatorium. One and a half years after treatment of pleurisy got bilateral tuberculosis. Died.
33	N. L.*	65 M	O	1	R	++	25	C	Recently (6 years after) again got pleurisy left side and cured again.
34	S. S.	38 M	O	2	R	++	16	F	Had productive tuberculous process in right apex to begin with. Fluid was absorbed. Temperature from 102°F to 103°F came down to 99°F to 100°F and continued. Later on developed tuberculosis and died.
35	K.	30 M	I	1½	R	++	19	C	Had bilateral pleurisy to begin with. Right side treated first and cured. The untreated left side still showed the same fluid level as before. Treated later on and cured. 3 years after treatment developed bilateral pulmonary tuberculosis and died.
36	H. R.	32 M	O	3	R	+++	26	C	
					L	++	20	C	
37	K. K.	15 F	O	1½	L	++	15	C	Case of cirrhosis of the liver. Fluid aspirated twice before starting treatment.
38	S.	20 M	I	1	R	+++	17	C	
39	M. M. B.	30 F	O	2	L	++++	20	C	Fluid disappeared but temperature continued. She had tuberculous adenitis neck and abdomen at the time of treatment.
40	B.	30 F	I	3	R	++	23	R	

Cases of Pleurisy with Effusion Treated by Short Wave Therapy from 1936 to 1941—Contd.

S. No.	Name	Age and sex	In or out-patient	Previous ill. health in months	Side treated	Level of fluid	No. of sittings given	Result	Remarks
41	R. P.	30 M	O	6	R	++	19	C	Developed bilateral tuberculosis one year after and is undergoing treatment.
42	S.	18 F	O	2½	L	++	8	C	Full term pregnant.
43	R.	28 F	I	1	R	++	8	C	
44	N. K.	25 F	I	2½	L	+++	28	C	
									Pleurisy developed after child birth. Had high fever, dyspnoea and tachycardia. 700 cc. of fluid aspirated. Tachycardia increased. Pulse became 168 per minute 4 days after short wave treatment started and patient made uneventful recovery.
45	S. K.	26 M	O	1	R	+++	26	C	Illustrated in the text.
46	P. V.	25 F	O	1	R	++	12	C	
47	R. D.	20 M	I	3	L	++++	20	C	Recently, i.e., 5 years after treatment developed pleural effusion on left side. Tried for 4 months aspiration of fluid and calcium intravenously but finding not much relief resorted last of all to short wave treatment, cured.
48	J. S.	24 M	I	1	R	++	17	C	
49	M. J.	20 M	I	1	L	++	13	R	Fluid disappeared but temperature continued. He had slight productive tuberculous infiltration left lung and caries of 5th rib. Later on developed active tuberculosis and died.
50	M. S.	30 M	O	3	L	++	10	C	Had spontaneous pneumothorax with resultant sero-pneumothorax.
51	P. V.	21 F	I	2½	L	++	22	C	A teacher. No other treatment given. Enjoys good health at present.
52	H. D.	0 M	O	2½	R	++++	36	C	

Cases of Pleurisy with Effusion Treated by Short Wave Therapy from 1936 to 1941—Contd.

S. No.	Name	Age and sex.	In or out-patient	Previous ill-health in months	Side treated	Level of fluid	No. of sittings given	Result	Remarks
53	P. D.	25 M	I	4	R	+++	26	C	After wards got dry pleurisy on the left side. To relieve pain was given pneumothorax. It did not relieve the pain, was given short wave therapy 5 treatments relieved it.
54	N. R.	30 M	O	6	L	++	19	C	
55	S. S.	16 M	I	1	L	+++	27	C	
56	S.	30 F	I	2½	L	+++	19	C	Illustration in text.
57	P. D.	25 F	I	2	R	+++	20	C	
58	G. S.	35 M	I	2½	L	+++	25	C	Developed bilateral pulmonary tuberculosis 5 years after, undergoing treatment.
59	H. S.	20 M	I	1½	L	++	25	C	
60	R. D.	50 M	O	1	R	++	12	C	
61	A. N.	28 M	O	1½	R	++	15	C	
62	G. R.*	25 M	O	1	L	+++	15	C	500 cc. of fluid aspirated few days before treatment started. Acute case. Died of acute miliary tuberculosis two months after treatment. Severe history of tuberculosis in family.
63	M. S.	27 M	O	4	R	++	18	C	
64	J.	30 F	O	2	R	++	21	C	
65	R. P.	22 F	O	1	L	+++	24	C	
66	M. R. M.	28 F	O	2	L	+++	34	C	One and a half year after treatment developed bilateral tuberculosis after delivery and died.
67	D. C.	33 M	O	5/6	L	+++	29	C	
68	R.	20 F	I	8	R	+++	34	C	

M = Male
F = Female
F.C. = Female Child
R = Right
L = Left

I = Indoor patient
O = Out door
C = Cured
R = Relieved
F = Failure

* = Relatives of Doctors
++++ = Fluid level whole of one side
+++ = ¾ full
++ = ½
+ = ¼

Short Wave Therapy of Pleurisy with Effusion—Captain Ram Singh

Case No. 20 N. L.

Case No. 20 N. L.

Case No. 20 N. L.



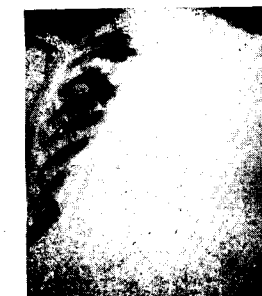
Skiagram No. 1
Dated 18-4-'38
Case No. 47 R.D.



Skiagram No. 2
Dated 3-5-'38
Case No. 47 R.D.



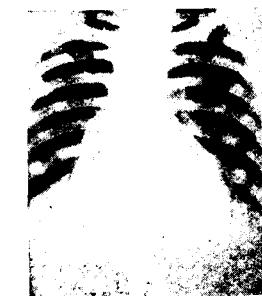
Skiagram No. 3
Dated 27-5-'38
Case No. 47 R.D.



Skiagram No. 1
Dated 27-1-'40
Case No. 56 S.



Skiagram No. 2
Dated 12-2-'40



Skiagram No. 3
Dated 16-3-'40
Case No. 56 S.



Skiagram No. 1, dated 29-5-'40



Skiagram No. 2, dated 29-6-'40

Discussion.—In all 68 cases have been treated. It gave uniformly good results in all except cases Nos. 22, 30, 34, 40 and 49. Thus the observations of LIEBESNY and FINALY (1932) RAAB (1932), SCHLIEPHAKE (1934), SCHULTZE (1934), SCHWEITZER (1934), LOB (1934), HAYER (1934), SCHEDTLER (1935), KALMANSON (1937), KOBAK (1937), SABERTON (1937) and others that short wave are effective in curing pleural effusions (though the number of cases treated and reported by them is small) are further corroborated by these series.

40 males and 28 females between the ages of 10 and 65 years were treated. The conjectured duration of illness previous to the treatment varied from 5 days to 8 months. 36 cases had wet pleurisy on the left side, 29 on the right and 3 were bilateral. No selection of the cases was made. All cases, referred to the Institute, were treated except those having signs of active tuberculous process in the chest. Two of the cases that were given 1-2 treatments, are not included in these series. 63 cases were completely cured, 3 were relieved and 2 were failures. 5 cases treated were the nearest relatives of the physicians referring the cases to the Institute. 23 cases of these were in- and 45 out-patients. Of these, one was of traumatic origin, and one each secondary to cirrhosis of the liver, pneumonia, spontaneous pneu-

mothorax and typhoid. The rest were cases of idiopathic or tuberculous pleurisy. Excluding the 5 cases of other pleurisies and 16 untraced cases; out of the remaining 47, 18 cases up-to-date (i.e., 6 years or more after the treatment) developed tuberculosis of which 9 died and 7 got treated and cured, and 2 are still under treatment. The per cent of cases getting tuberculosis after pleurisy within 6 years or so as reported by BURREL (1933) and FISHBERG (1932) was about 40% and 30 to 40% respectively.

3 female cases (Nos. 2, 26 and 43) were pregnant when treatment was given to them. These ended in normal deliveries and the children born were healthy. This means, that there was no deleterious effect on the foetus when chest was being irradiated.

48 cases had fever ranging from 99°F to 104°F. It was relieved in all, but 5 cases. Temperature began to decrease from the 1st or 2nd sittings and came down in 7-10 sittings. In one case it came down with the very first sitting and in few others in 2-3 sittings. In some, slight temperature (99°F to 99.2°F.) continued for long periods. This, in my opinion, was due to the heating effect of the tissues by short wave. SCHLIEPHAKE (1938) also held the same view.

SCHEDTLER (1935) recommended that the fluid should always be aspirated before starting the treatment.

I am of the opinion that in cases of dyspnoea due to excessive fluid aspiration shall be carried out but in acute or subacute cases, the less the interference the better. From the chart it is evident that cases with pleural cavity absolutely full of fluid, can be easily cured with short wave therapy alone. In chronic cases, as suggested by him it may be of help but even without aspiration cases could also be cured. In these series, before starting the treatment, in Case Nos. 39 and 47 fluid was removed to relieve the dyspnoea and in Case No. 37 aspiration was done to relieve the dyspnoea and tachycardia but the latter became worse.

Some of Schliephake's and others' cases besides short wave therapy did get other treatments e.g. aspiration of fluid and injections etc. In 40 of my cases no such other adjuvant help was afforded and were only given short wave treatment. In some cases e.g. Case No. 8 treatment with injections of calcium alone, Case No. 10 with tuberculin and calcium and in No. 48 calcium injections and aspiration, were tried and failed then short wave treatment was started and proved successful. In cases in which short wave treatment failed in my hands the other treatments too were of no avail.

Pain disappeared in all cases. It lessened almost always with the first sitting and after 4-5 treatments completely subsided.

Acute and subacute cases were cured without leaving any or very few adhesions. In cases where there were adhesions when the treatment was given up when examined later on it was found that there was no thickening of the pleura or any adhesions of the diaphragm. In chronic cases some thickening of the pleura or basal adhesions were usually left.

PEACEY (1937) quotes a case who got a feeling of tiredness in the evening after the sitting and after the 4th sitting was 'collapsed' and that feeling frightened him and he did not attend further for treatment. SCHLIEPHAKE (1938) reported a feeling of pressure in the chest and mild dyspnoea 2-3 hours after treatment. Except some slight giddiness in acute cases who were being treated in sitting posture and slight headache in some cases no untoward symptoms of any significance were noticed by me or complained of by my patients.

While agreeing with KALMANSON (1937) that in acute cases 'do not produce an embarrassing hyperaemia in an already congested area,' the sittings were of 10 minutes only and did not exceed 15 to 20 minutes. In subacute and chronic cases his recommendation of longer periods 20-40 minutes was not followed. The maximum time given in these series was 30 minutes and that too in few chronic cases only. PEACEY (1937) too in this aspect was of the same opinion.

The cases which did not respond to the treatment:

Case No. 22: She had a positive tuberculous history in the family and was a recent contact. Short wave therapy relieved the temperature but there was no change in the fluid level. Whether it was due to thickened pleura that the fluid could not be absorbed or else it was due to the effect of Entodon injections, or the allergic condition was very high, or due to some other effect which could not be judged. Later on, she developed tuberculosis and died.

Case No. 30.—He gave 6 months previous history of typhoid fever. During the short wave treatment his temperature went up, ranged irregularly between 99 to 102° F. To relieve his discomfort, the fluid was aspirated thrice (500 c.c. 1100 c.c. and 1100 c.c. respectively at intervals of 4 and 5 days). This also did not relieve his temperature. Nothing abnormal was detected in the fluid examinations. The short wave therapy was continued upto 46 sittings (2-5-'39) but the fluid increased and became + + + + (which was + + to begin with on 11-3-'39 when treatment was started). Finding no relief, short wave therapy was given up, the patient continued to get the temperature for another month during which period he was given injections of Sodium Morrhuate and Calcium. He left the hospital on 14-6-'39 at his own risk. It cannot be explained as to what was the reason of failure.

May be, it was a relapse of typhoid fever. This patient could not be traced afterwards.

Case No. 34.—The fluid was absorbed after 16 sittings. The temperature which ranged between 100° F to 103° F. came down to 99° F to 100° F. The continuation of temperature appears to be due to the tuberculous focus he had. He later went to hills and developed tuberculosis and died.

Case No. 40.—She had tuberculous adenitis neck and abdomen at the time of treatment. The continuation of her temperature even after the treatment may have been due to their activity.

Case No. 49.—Fluid disappeared after 13 sittings, but the temperature continued. Re-examination revealed that he had slight productive tuberculous infiltration in the left lung and caries of 5th left rib and the continuation of slight temperature 99-100° F. was due to its activity. He was cured of his fever and lesion, but an year later, developed active tuberculosis and died about 4 years ago.

A few of the illustrative cases: Case No. 20.—N. L., 22, M. clerk, married, a teetotaler and vegetarian. No history of tuberculosis in the family. Admitted in Rajindra Hospital as a case of left sided wet pleurisy. On admission the temperature was 100.4° F, pulse 110, respiration 23 p.m. liver and spleen palpable. W.B.C. count 6000. R.B.C. 2,700,000, polys 64%, lymphos 3%, large

monos 4%, eosinos 2%, H.G. 48%, Sputum for tuberculosis negative. 25 c.c. clear straw coloured fluid was drawn from chest. It showed preponderance of lymphocytes, 4% of albumin and no micro-organism. X-ray examination on 18-4-'38 (Skia-gram No. 1) showed lower half of the left lung field covered by a dense opacity which increased in height towards the lateral chest wall. The rest of the lung field also was not quite clear. On fluroscopic examination in the recumbent position the whole of the left side became opaque. Normal findings on the right side. He was given short wave therapy from 18-4-'38. The pain disappeared after 2 sittings. The temperature was a continuous one and ranged between 100° F to 104° F. On 26-4-'38 the patient complained of pain on the right side too. He was screened and fluid was detected on the right side. X-ray examination of 3-5-'38 (Skiagram No. 2) showed on left side small remainders of pleuritic fluid and on the right side the lower half of the lung was covered by a dense shadow not to be separated from the diaphragm. Short wave therapy was started on the right side from 5-5-'38. The right side was treated till 26-5-'38 and the examination of 27-5-'38 (Skiagram No. 3) revealed the chest to be clear of any effusion. The patient was discharged as cured after 34 sittings of 20 minutes each to both sides.

Case No. 47.—R.D. 20 M., Beggar of Simla Hills, unmarried was admitted in the Rajindra Hospital on 26-1-'40 complaining of pain in the left side of the chest, cough, weakness, severe breathlessness and low fever of 3 months duration with an out patient's diagnosis of left side pleurisy with effusion. Nothing special in the family and personal history. His temperature was 100.2° F, pulse 108, respiration 24 p.m. Blood count: W.B.C. 4375, polys 77%, lymphos 22%, eosinos 1%, haemoglobin 40%, total R.B.C. 2,770,000. Sputum negative for mycobacterium tuberculosis. Skiagram of the chest dated 27-1-'40 (No. 1) showed, the whole of the left lung covered by a dense homogenous opacity. The heart was shifted towards the right side so that the right atrium approached the right lateral chest wall within half an inch distance. The conclusion arrived at was wet pleurisy left side with displacement of the heart. To relieve his dyspnoea on 29-1-'40, 300 c.c. of the pleural effusion were removed. The laboratory report of this fluid was, reaction alkaline, albumin 4.8% R.B.C. + + + on culture coliform bacilli growth.

He was again tapped on 2-2-'40 and 6-2-'40, 500 and 400 c.c. of fluid were removed respectively to relieve his increasing dyspnoea. Skiagram (No. 2) taken on 12-2-'40 showed the left side of the chest still nearly

completely opaque, but the heart which was pushed by the liquid towards the right chest had gone back about $1\frac{1}{2}$ inches. Short wave therapy was started on 14-2-'40 and continued till 16-3-'40. His skiagram (No. 3) taken on 16-3-'40 showed normal findings without any fluid or any adhesions. Heart appears slightly enlarged. In all 28 sittings of 30 minutes each were given.

N.B.—The pleurisy may be secondary to pericarditis as the slight enlargement of heart and the B-coli in culture pointed to it.

Case No. 56.—S. 30, F, admitted in the Rajindra Hospital as a case of fever of $2\frac{1}{2}$ months duration. The temperature ranged between 99°F to 101°F . She had breathlessness on exertion and some dry cough. The trouble started a month after the birth of the last child. Nothing special in the personal and family history. Clinically she was labelled as a case of left side pleurisy with effusion and this was confirmed by X-ray examination (Skiagram No. 1, dated 29-5-'40). About 5 c.c. of the fluid from the chest was drawn with the following result. Colour pale yellow, albumin $4\frac{1}{2}\%$ a few lymphocytes per field. No micro-organisms cultured. Total and differential counts normal. Sputum examination was negative for mycobacterium tuberculosis. Short wave treatment was started on 7-6-'40 and had 20 minutes sittings

each day except Sundays. Fever came to normal after the 3rd sitting. She was given 19 sittings—till 28-6-'40 when she was cured. On 29-6-'40 the X-ray examination (Skiagram No. 2) showed no pathological changes in the chest.

Summary and conclusion.—1. Short wave therapy is a simple measure, easy to administer and manipulate and the patients who underwent this kind of treatment like it. It has proved in itself a self-sufficient and efficient treatment to cure cases of pleurisy with effusion.

2. Short wave therapy cured the great majority of the cases (63 to 68) of pleurisy with effusion.

3. The health of the patients can be augmented during the course of short wave therapy by other means which did not alter or hinder in any way its curative efficiency.

4. This treatment has proved to be effective in all forms and types of the disease in both sexes and in all ages.

5. It relieved the pain and temperature.

6. All patients, whether rich or poor reacted alike.

7. Aspiration of the pleural effusion during the treatment except in cases where it caused dyspnoea is not essential before starting the treatment.

8. No complications or any after effects were observed during or after the treatment except in some cases where the patients complained of slight giddiness during and slight headache after the sitting.

9. No burns—superficial or deep were observed in any of the cases treated.

10. Pregnancy is not a bar in its effectiveness and no harmful by-effects were seen either in the mother or in the foetus.

11. In addition to the physician's perception and experience, the perfection of technique plays an important part in the successful administration of short wave therapy. The more acute the process the lesser is to be intensity of the electric field and shorter the time of exposure required for its beneficial effects.

12. Short wave treatment has got no prophylactic action on the development of post pleuritic tuberculosis.

Acknowledgments.—I am thankful to the staffs of the Rajindra Hospital Bhopindra Clinical Laboratory for their kind co-operation and help. My grateful thanks are due to my former chief, Dozent Doctor GEORG POLITZER, M.D., M.M.R., (Vienna), Director of Medical Services, for his invaluable suggestions and guidance and to my colleague Dr. MADAN TEWARI, M.B., B.S., for his assistance in compiling the various

datas and records. Last, but not the least my special thanks are due to the staff of the Institute who carried out the day-to-day treatment of the cases reported in these series.

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A Paper on Action and Role of Roentgen Rays in the Treatment of Breast Carcinoma, Particularly

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WORTHY PRESIDENT AND LEARNED PROFESSIONAL BROTHERS AND SISTERS :

I CRAVE your indulgence for a few minutes when I venture to read this paper before you, in order to direct attention to some of the fundamental facts about X-ray therapy, which is not as yet, sufficiently recognised, especially in Gujrat and Kathiawar provinces. Keeping in mind the ability of general practitioners to grasp this dry and difficult subject and so without entering into the confusing technical details, I just mention the broad outlines of main principles and actions of X-rays, used therapeutically, with a particular reference to the carcinoma of breast.

According to the law of Arndt-Schulz for Radiation, "Small doses of X-ray stimulate cells, medium doses of X-ray inhibit growth of cells, and large doses of X-rays destroy cells."

This is a simple and in many respects, a satisfactory statement, of what is known about action of X-rays on normal tissues; it will serve as the foundation for a clear

concept of what we try to accomplish in X-ray therapy.

Seven Salient features about X-rays.—1. There does exist different susceptibility of various types of tissues to X-ray radiations.

Sensitivity to X-radiation is proportional to the degree of differentiation of cells.

Tissues, in order of sensitivity, can be mentioned as the more sensitive being lymphatic tissues, testicles, ovaries, germinal layer of skin, hair, papillae and so on, the least sensitive being, muscles, cartilages and bone.

In normal tissues, the peculiar sensitiveness to radiation is well illustrated by the case, with which very small doses of X-rays destroy the virility of such highly specialised epithelial cells as spermatozoa.

2. In diseased tissues, greatly sensitive are the hyperplastic connective tissues and the young rapidly growing cells of embryonic type.

3. Contrary to what was once a common belief, X-rays do not kill bacteria.

* Read on 26-4-47 in the Scientific Session of the First Gujrat and Kathiawar Provincial Medical Conference of the Indian Medical Association at Ahmedabad.

4. Not all lesions are alike, not all tumours identical, not all tumour-cells equally sensitive nor do they react equally to radiation.

5. Pathological tissues are more easily influenced by irradiation than the normal ones.

6. The most conspicuous effect of X-rays on blood, is the diminution in lymphocytes, which is brought about not by the destruction of those in circulation but by preventing their formation.

R.B.Cs. are unaffected by X-rays, unless one gets a very prolonged exposure of X-rays.

7. X-rays are just as efficient as radium provided of course, that they are properly administered.

X-rays are applied in such a manner as to deliver the maximum efficient dose into the tumour, without injury to the normal skin and tissues. That can be done by giving homogeneous irradiation by converging beams *i.e.*, by directing rays through several opposite ports of entry so that an uniform distribution of rays, is produced within the body of tumour.

Indications for X-ray therapy—X-ray therapy is used to produce the following seven main effects:—

(1) Stimulation *e.g.*, in case of amenorrhoea and sterility in the young; small doses of X-rays are given on ovaries and pituitary.

*Quoting the American statistics:—*132 patients—young married ladies suffering from amenorrhoea and sterility, and having already undergone all the medical treatment, including the hormone therapy and even twice or even thrice dilatation and curettage operations, were given the stimulating doses of X-rays on ovaries.

The resumption of regular menses occurred in 79 patients; 44 of them became later on pregnant and gave birth to 52 children, some getting twins.

(2) Inhibition of the growth or function of a gland *e.g.*, in menopausal menorrhagia, for ovarian hypersecretion, deep X-ray therapy for 3 or 4 days on abdomen and off it goes for ever.

(3) Solution of hyperplastic connective tissues *e.g.*, keloids, fibroid of uterus.

(4) Reduction of lichenification *e.g.*, chronic eczema of wet or dry type, of months and years' duration only one sitting of superficial X-ray therapy cures it for ever if proper instructions are fully followed.

(5) Relief of pain and itching *e.g.*, neuralgia and pruritus.

(6) Reduction of inflammation *e.g.*, carbuncles, scrofula, arthritis (1-3 deep X-ray sittings), (4-5 sittings).

(7) Destruction of malignant growth *e.g.* by direct lethal action.

Plan of X-ray treatment—In all cases, X-ray treatment should always be planned on the following five basis—

1. Examination of the patient:—In spite of definite diagnosis of malignancy, the radiologist must make an examination of the patient himself, in order to acquaint himself with the following seven points:—

- (a) Condition present.
- (b) Extent of lesion.
- (c) Presence of associated conditions.
- (d) General condition of the patient.
- (e) His ability to stand the irradiation treatment.
- (f) Presence of surgical dressings requiring special attention.
- (g) To determine whether the proposed treatment will in any way leave an unpleasant conditions as its after effect.

2. Decision as to the type of treatment whether ambulatory or hospitalisation.

3. Method of treatment:—Whether by X-rays alone.

„ Radium alone.

„ Combination of both

X-rays as a preoperative measure.

„ post operative „

„ palliative „

4. Question of Metastasis to be considered.

5. Preliminary preparation of the patient must be in the form of build-

ing up the patient mentally physically and hygienically.

Classification of carcinoma of breast:—I feel that it will not be out of place to mention the latest classification of carcinoma breast, as read in recent American literature.

Seven types of carcinoma occur in breast:—

1. Adeno carcinoma.

Retracted nipple
Shrunken
Stony hard

2. Ductcell carcinoma

Diffuse Scirrhus
Cancer en cuirasse
Comedo cancer

Infiltrating contractile fibro-carcinoma

Advanced stage with nodular skin nularasis with difficult breathing

3. Acinar carcinoma from Epithelial cells of Acini.

4. Sweat-gland carcinoma.

5. Acute inflammatory carcinosis.

6. Paget's disease of the nipple of breast.

7. Epithelioma of the skin of breast.

The treatment is the same in both the sexes.

Treatment of breast-carcinoma depends upon the following few factors:—

1. Condition of the tumour

Primary operable
„ inoperable
Recurrent operable
„ inoperable

(a) Primary operable—

Where:—(i) No infiltration through tissues;

(ii) none or freely mobile axillary glands; and

(iii) no distant metastasis.

This can be easily removed by Surgery but the best procedure would be in order: first preoperative irradiation; then radical operation; and then postoperative irradiation.

(b) Primary inoperable:—

Where: (i) Extensive infiltration;

(ii) greatly enlarged glands; and

(iii) fixed to chestwall.

Here by irradiation first, it can become operable. But in acute inflammatory carcinosis occurring in the young—operation is contra-indicated.

(c) Recurrent operable—

Where: (i) Small and localised lesion; and

(ii) no distant metastasis is definitely amenable both to Surgery or irradiation.

(d) Recurrent inoperable—

(i) diffuse local invasion; and

(ii) wide metastasis.

Here Surgery is used only for removing the foul lesions otherwise the palliative irradiation is the only choice.

2. Irradiation alone:—

Carcinoma of breast is not a sufficiently radiosensitive growth, to justify treatment of operable cases

by X-rays, in preference to operation.

Irradiation alone, may frequently cause the tumour to diminish and sometimes to disappear but unaided, it can't be relied upon to effect a permanent cure because irradiation is essentially a measure, subsidiary to Surgery, the relative parts these two agencies play, being determined by the extent and clinical features of the tumour.

3. Extent of the lesion—

if fixed to the chestwall and } operation.
if of cuirasse type }
is contra-indicated and palliative irradiation is the choice.

4. Metastasis — local
distant

Local—if extensive multiple foci fixed

Glands greatly enlarged.

— then no operation is advisable.

Pre-operative Irradiation.—It is employed for the following aims:—

(1) To decrease the bulk of the tumour and so permit easy removal by surgery.

(2) To insure attenuation of malignant cells before operation and thus to render it less active than surgery is used to remove the residual attenuation or quiescent malignant tissues.

(3) To inhibit or control dissemination of malignant cells after operation, by setting up a preoperative

protective mechanism, within the surrounding tissues.

Irradiation stimulates the production of certain substances (enzymes of macrophages) which are inimical to the growth of the tumour.

This protective mechanism is usually produced:—

- (i) At the junction of healthy and pathological tissues ;
- (ii) in the blood ; and
- (iii) in the reticulo-endothelial system.

However the practice of preoperative irradiation has only gained a limited adoption, because there are two objections usually advanced :

1. In early cases, the usefulness of preoperative irradiation is somewhat neutralised by the danger, that some patients may refuse or postpone the operation in the hope that the shrinking of the tumour, following preoperative irradiation, indicates that the cancer has been destroyed.

The remedy here is to inform fully the patient beforehand and take her into entire confidence.

2. The fibrosis, caused by irradiation increases the difficulty of operation,

Irradiation acts upon the tumour by its direct lethal action and not by destroying the tumour-cells by fibrosis.

Fibrosis is not, by any means, an invariable result of irradiation.

It occurs chiefly when the tumour is complicated with sepsis and when, as the result of either of the growth itself or the application of heavy doses of irradiation, there has been extensive tissue destruction. Under such circumstances, the fibrosis is a physiological process of repair.

But with modern techniques in X-ray therapy, however, little or no fibrosis need be caused in the healthy tissues.

For achieving this object, few precautions are necessary for the therapist:—

- 1. Use higher voltages, e.g. 200 k.v. and 2 mm. cu.
- 2. Give less than the maximum dose.
- 3. Treatment should not be extended over a long period, not more than 15 days.

Thus in preoperative irradiation, the object should be to saturate, rapidly the immediate surroundings of the tumour and the fields of lymphatic spread. Thus it becomes more a peripheral attack.

It is done mostly by—

- (i) deep X-rays—for large and deep lesions or by (ii) radium—for localised and accessible lesion by the interstitial method.

X-rays should be applied directly over the area of involvement and all the lymphatic drainage area, i.e., chestwall, axillary, supraclavicular, sternal, scapular mediastinal, etc.

Post-operative Irradiation.—It is also called the prophylactic irradiation but really the prophylactic treatment is defined as the treatment used as a preventive against the disease. Strictly speaking, here the treatment is used mainly as a preventive of recurrence since in all cases, it is used after the removal of the tumour; therefore, it is better to call as preventive of recurrence.

It is employed in the following conditions especially :

- 1. When the tumour is partially removed or destroyed—then the irradiation controls or destroys the remaining growth.
- 2. When the radical operation is already performed—then irradiation is to control recurrence by preventing the development of residual cells or masses, too small for detection by eye, at the time of operation, locally and in lymphatics.
- 3. When only the primary is removed and neighbouring metastasis is not removed.
- 4. When generalised metastasis are present—here operation is now only for confirmation of diagnosis or to relieve the mechanical or functional distress.

Unlike preoperative irradiation, postoperative irradiation is widely practised and its value is now recognised by most surgeons.

Most experienced roentgenologists

do believe that the postoperative X-ray treatment, given with skill and courage, increases the number of 15 year's cure about 10% when only the breast is involved and about 25% when axillary metastases are present; because it is more difficult to influence the primary than the secondaries.

Postoperative irradiation can be done by X-rays—for large and deep lesions or by radium—for localised lesions.

It is to be given as soon as the wound heals up, i.e., 7–14 days after the operation.

Here also X-rays are applied on chestwall and all lymphatic drainage area.

Palliative Irradiation.—It is mainly employed in advanced cases for the following effects:—

- (1) To prolong the period of comfortable life;
- (2) To relieve intolerable pain of bone-metastasis; and
- (3) To prevent almost always the breaking down of the tumour with its attendant pain, foul odour and mental anguish.

It is also done as above by X-rays or Radium.

Dosage.—As there is an unit of measure in length and weight, e.g., inches and centimetres, grains and gramme, so also in X-ray radiations the smallest measure is the international unit of X-radiation and is

called "roentgen" and is designated as small "r" e.g., 90r, 150r.

The exact technical definition runs as follows:—

The unit of X-radiation is that quantity of radiation, which when all the secondary electrons are fully utilised and wall-effect of ionising chamber is avoided, produces in 1 cc. of atmospheric air at 0°C. and 76 m.m. mercury such a degree of conductivity that one electro-static unit of charge is measured at saturation current.

While treating a patient, various factors, governing the tube-techniques, are to be taken into consideration, e.g., k.v.; ma.; filter; F.S.D.; area, exposure r units; region of the body; sittings per day daily or at intervals; how many days and when the next series is to be repeated and so on.

In postoperative treatment.—Usually 200 k.v. 5 ma. 50 cms (0.5 cu. + 1.0 al.) necessary size of the cone; 1-2 fields per day; 150r per field daily treatment until 900-1500r per field.

If glands are enlarged—give up to 1500-3000r per field.

In preoperative treatment.—In the same technique, it is to be given:

(i) Upto 700-900r—operation is to be done 3 weeks after.

(ii) if 2000-3000r given—operation is to be done 6-8 weeks after.

In palliative treatment.—In the same way as above but smaller doses on longer intervals.

Recurrences.—May occur as a result of continued growth of insensitive or non responsive types of malignant cells.

It may occur on any time after operation in the scar area and in surrounding tissues:

(i) if small and movable—excision and then irradiation.

(ii) if large and bulky—irradiation upto 2000-3000r.

(iii) if small multiple nodular masses in skin—treat by X-rays on low k.v., preferably use low-voltage therapy by Chaoul's apparatus called as contact therapy because X-rays come in direct contact with the tumour, as soon as they are produced.

Here:—60 k. v., 4 ma, 0.2 cu.,
3 cms.—400r minute
20 sq cms., F.S.D. 5 cms.—100r minute

1-3 fields per day upto 4800-6000r per field.

This method of contact therapy is regarded as a fully equivalent and faultless substitute for radium therapy in superficial cancers.

Worth nothing accessory treatment in breast carcinoma.—This is sterilisation, i.e., the production of artificial menopause either by irradiation or by surgery and this is a very valuable therapeutic measure.

Carcinoma of breast in young women is more malignant than in women who have passed menopause.

Pregnancy may cause exacerbation with unusually rapid progress of the disease.

Oophorectomy was advised on the assumption that artificial menopause would retard the progress of the disease. Experimentally, two cases of breast carcinoma with radical mastectomy done but extensive bone

metastases were present. Both were given pelvic irradiations, because of intractable pelvic pain and both showed surprising evidences of improvement which was manifested by definite regression and even by complete return to normal appearance of the bone radiologically; there is also concomitant relief from pain and improvement in general condition of the patient, which may continue from several months to two years even;—all the improvement is entirely due to elimination of ovarian hormone. Therefore, this method is at present definitely useful especially in cases of bone-metastasis.

Complications.—Just to number them:—

1. Irradiation-sickness—due to absorption of the broken down tissue-protein; acidity gets increased.

2. Pleuropulmonitis—usually follows after direct irradiation through lungs; therefore it is always better to irradiate tangentially the chestwall.

3. Metastasis
 local
 general

 skeletal
 visceral,
 e.g., liver,
 lungs.

Skeletal—Bone. involvement is generally regarded as the terminal stage in the history of cancer-invasion.

Usually occurs in vertebrae, pelvis and ribs. X-ray irradiation is used in both types because it is readily applied, effective and analgesic.

600-1000r is quite sufficient.

4. Oedema and swelling of the

arm—is most-ly due to

lymphatic or vascular stasis
post-operative scar contraction
malignant involvement of axillary glands—then use high voltage deep therapy.

5. Pathological fracture, e.g., in spine

6. Ulceration of chestwall.

7. Cachexia.

As for advanced cases mere size of a primary tumour is no contra-indication; against irradiation; very large tumours some times diminish considerably and may even disappear.

Too often, however, cases are referred for X-ray therapy, not only when the primary growth is enormous but when the body is riddled with metastases.

To refuse treatment under these circumstances, appears hard-hearted especially when the relatives of the patient are anxious that something should be done. In few cases some relief of pain may result but generally, owing to discomfort of exposures, the only effect is to increase suffering.

The radiologist really should not treat such cases, inspite of relative's desire. The real remedy lies in the better education of the medical profession and the laymen alike, in the proper place of X-ray therapy.

X-ray therapy should be the first and not the last resort. The X-ray department should not be regarded as the anteroom to the mortuary.

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The Indian Journal of Radiology

Vol. I.

MAY, 1947

No. 2.

Radiological Training in India

IN the first issue of the Indian Journal of Radiology we gave an account of the development of radiology in this country and of the events that led to the organisation of the First Indian Congress of Radiology and the justification for the starting of an Indian Journal of Radiology, as the Official Organ of the Indian Radiological Association. In that, we had pointed out that there has been a greater tendency for medical men to specialise in the art and science of radiology and radio-therapeutics. While admitting that much good work has been done by those practising this art and science, we must stress the necessity for improving the radiological training now existing in India.

Most of our pioneers in radiology had their training in the United Kingdom, in London, Edinburgh, or Liverpool. Some however, had their training in some other well-known continental centres. Then there was

established a centre at Dehra Dun which is now disbanded. In those early days more stress was laid on diagnosis than on therapy. Conditions have, however, changed. We are now having training centres at Lucknow (University course) Bombay (University course, as well as the course by the College of Physicians and Surgeons) and Madras (Barnard Institute of Radiology run by the Government of Madras). But, there is no uniformity of standard available. Duration of course and syllabus vary and sufficient stress is not being placed on the importance of both the diagnostic and therapeutic aspects. It would be advantageous for us to consider the principles established by the American Board of Radiology. They have enunciated the following principles:

"After completion of the internship there shall be a period of special training in Radiology of not less than three years in clinics, hospitals

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or dispensaries recognised and approved by the American Board of Radiology and the Council on Medical Education and Hospitals of The American Medical Association as competent to provide a satisfactory training in Radiology. This period of specialised training shall include:

- (a) Graduate training in pathology, radiation physics and radiobiology.

A period of six months fulltime training in pathologic anatomy is recommended but where this is not possible to arrange, the student, during his three year training period may, by attending pathologic conferences, post-mortem examinations and studying removed tissues, receive adequate training in pathology. It is recommended that radiation physics be taught by a combination of didactic lectures, practical examples and direct clinical demonstrations.

- (b) An active experience (residency) of not less than twenty-four months in an institution, the radiologic department of which is recognised and approved by the The American Board of Radiology and the Council of the Medical Education and Hospitals of The American Medical Association as capable of providing satisfactory training.

- (c) Examination in the basic sciences of Radiology as well as the clinical aspects thereof.

These examinations should be given by the student's instructors in order to allow those responsible for

his training to certify to the Board that he is adequately prepared."

A mere perusal of their requirements will show how insufficient is the nine months' or a year's course that we give to medical men in this country. It is only when our medical men are given detailed teaching of pathology, radiation physics and radiobiology and are taught correlation of pathological conditions with shadowgraphs of X-ray films, can they understand and realise the importance of their speciality. And more important perhaps than this is the resident appointment for a period of one or two years—the longer the better—in recognised hospitals or institutions. Clinical radiology can and should be taught only in this manner.

Radiology has, without doubt, made great progress in the past decade. The World War that is just over, gave a fillip to its development and study. Emergency situations had necessarily to produce remarkable progress on the development, both in diagnosis and therapy. But, at present, it is too early and perhaps we do not have sufficient data to assess the benefits derived from these extra-ordinary War conditions. Perhaps the next International Congress of Radiology will enable us to form a clear idea to assess values at their correct level. Meanwhile, we should try and follow the basic scheme of the American

Board of Radiology not only for new colleagues desirous of entering the field of medical radiology, but also for those practising radiology now in one or more of its branches by allowing the latter to attend refresher courses specially organised

to enable them to raise the standard of radiological service. For this purpose, the Indian Radiological Association has been formed and to enable our readers to know what planning we are doing in this country, the pages of this journal are always open.

P. RAMA RAU,

Abstract From Current Literature

Osteohydatidosis — Its Radiological features:—Dr. M. A. Bellini—Radiology—Vol. 47, No. 6, Dec. 1946, P. 569.

This means osseous involvement by *Tænia Echinococcus*. Bone involvement occurs in about 1% of *Echinococcus* infestation.

Tænia echinococcus embryo reaches the bone through arterial circulation and establishes itself in the spongy bone. Micro-vesicles replace the medullary tissue, molding themselves to the contours of the bony spaces and diffusely infiltrating the bone. As in other parts of the body, no adventitious membrane is formed since there is no intermixture of connective tissue elements. Hydatid disease of bone differs from Hydatid disease elsewhere in (a) that the vesiculation is exogenous and (b) that there is no adventitious membrane. When the parasite lodges in bone it is unable to follow its usual mode of development, because of the resistance of the tissue; it assumes an exogenous type of vesi-

culation. The micro-vesicles, arising in the walls of the primary vesicle advance eccentrically, taking on an independant existence and produce "grand daughter vesicles" which invade the bony tissue. The process is in the nature of a mechanical effect and may continue silently for years without exciting any reaction such as an osteitis. Only later is there associated necrosis of toxic or ischæmic origin.

The cortex of bone is not at first interrupted and the general configuration of bone is unchanged. With progressive invasion, the cortex eventually gives way and extra-osseous signs of hydatidosis become evident. Among the most significant of these is the ossifluent abscess of Hydatid origin. Once the periosteum is penetrated the vesicles are no longer imprisoned within the confines of the bone and growth assumes a more rapid pace: the adjacent tissues react in an attempt at encystment and a common adventitious membrane is formed

enclosing numerous vesicles of various size. The abscess so formed has no germinal layer, which should always suggest its bony origin. Growth is slow and is over a period of years.

Development of osteohydatidosis can be divided into two stages.

First stage:—There is no micro-vesicular infiltration; the vesicles enlarge, areolar pattern of bone is destroyed and there may appear on the film rounded cyst like spaces limited by thin trabeculae producing the appearance of a bunch of grapes.

Second stage:—Occurs late in the disease and is one of engrafted infection with the development of an inflammatory osteitis which is absent in the early stages. Calcification of the trabeculae confirms the presence of secondary infection and resulting hyperostosis and condensation process may cause the disappearance of the grape like shadows.

There is no sharp demarcation between normal and diseased areas of bone and usually, due to an infection of gradual evolution, hyperostosis predominates over osteolysis. The periosteum does not show any reaction, unless involved by the secondary infection when it shows the usual characteristics of osteitis.

Pathological fractures may occur in the involved bone as a result of slightest trauma and may be the first feature calling attention.

The spongy tissue of the vertebral bodies is a favourite site of osseous involvement. Nearly 50% of cases involve the spine; bones of the pelvis follow

next in order of frequency. Vertebral hydatidosis is usually associated with involvement of the contiguous rib. It is not usual to observe decrease in the height of the body of the vertebra as in Pott's disease. The intervertebral cartilage is not attacked. The differential diagnosis is from osteosarcoma, giant cell tumour, osteitis fibrosa cystica, solitary bone cyst, and vertebral angioma.

However, in its earliest stage osteohydatidosis does not permit of unequivocal diagnosis. Its occurrence should be suggested by (a) its gradual evolution (b) its slight effect on the general condition of the patient and (c) the successive bony changes which are demonstrable on the roentgen film.

Puncture biopsy is advised in cases of doubt.

S VENKATESWARLU.

Giant-cell tumours of soft tissue origin.—M. I. Smedal, Radiology, Dec. 1946, pp. 562-568.

The benign giant-cell tumour is the most common neoplasm occurring in the periarticular tissues, ligaments, tendons and bursae located near joints. It forms about 45% of all tumours, benign and malignant in these areas. The single most common site was the flexor surface of the right index finger. The giant cell tumours arising in synovia have a predilection for the knee. The age of incidence ranged from 5-82 years, the peak incidence being in the 3rd decade.

Symptoms and signs:—The usual complaint is the occurrence of a slowly

growing mass which causes mechanical difficulty with a joint or creates a fear of malignant growth.

Tendon—sheath tumour is a small mass, $1\frac{1}{2}$ to 2 cm. in diameter, which can be palpated subcutaneously in the vicinity of a tendon; it is not fixed to the skin nor is the motion of tendon affected except when it becomes a mechanical block, due to its bulk.

Synovial tumours—Large diffuse tumours may show pressure erosion of bones; the smaller ones produce no bone or joint changes. In the knee the symptoms are said to be similar to internal derangement and there may be produced a sero-sanguineous fluid inside the joint cavity.

These tumours are to be differentiated from the following:—

(a) Chondroma—Harder than a giant-cell tumour.

(b) Lipoma—Softer than a giant cell tumour.

(c) Carcinoma—Skin involved and fixed.

(d) Osteoma—Fixed to bone.

(e) Ganglioma—More commonly seen on dorsum of wrist.

(f) Tuberculosis—No differential criteria are given.

(g) Fibroma—Very rare.

(h) Tumour of Tendons—Exceedingly rare.

Pathology—They are firm, lobulated masses greyish white in colour with yellow or yellowish brown streaks or areas. They have a fibrous capsule and do not invade the tendon or the tendon sheath space. They do not invade bone: but

pressure erosion may occur if they reach sufficient size. The majority are small, but some may attain a diameter of 5 cm. even on a finger or toe. They may be circumscribed, pedunculated or diffuse. None has been known to metastasise.

Microscopically the tumours are characterised by the presence of giant cells, hæmosiderin, macrophages and foam cells in varying numbers. The type of cell seems to be a large polyhedral cell. There may be varying numbers of spaces lined by synovial-like cells, containing varying amounts of lipoid material and/or nests of hæmosiderin.

Various theories are postulated as to causation:

(1) That it is a neoplastic process.

(2) That it represents an inflammatory response to an as yet unknown agent.

(3) It is due to disturbed metabolism plus trauma and infection at the site of local lesion.

Treatment.—Treatment of choice is surgical excision. Rarely this may be impossible and it may become necessary to amputate the limb.

Additional radiation therapy was given in some cases. Recurrence may be occur, sometimes even after years.

Promising results with X-ray therapy in recurrent lesions of diffuse synovial type are reported.

S. VENKATESWARLU.

Treatment of inoperable carcinoma of the breast with irradiation.—Charles L. Martin. Surgery 19:132-148, January 1946.

In spite of the good results obtained with radical surgery in early cases of cancer of the breast, less than one-fourth the patients entering cancer clinics today can hope for a surgical cure. Haagen-sen and Stout (*Ann. Surg.* 118:859, 1943), reporting on 640 cases treated by radical mastectomy, showed that 22.2 per cent of the total number could be classified as five-year cures, while the remaining 77.8 per cent required some form of palliative therapy. Data are presented by these same writers upon which a choice between radical and palliative therapy may be based.

For palliative irradiation the author favours in general the implantation of weak radium needles as advocated by Keynes. A minimum of sloughing and fibrosis is produced, and both primary and secondary tumours in and about the breast are often completely eradicated. Methods of implanting the needles and calculating dosage have been described elsewhere (see *Am. J. Roentgenol* 48: 377, 8942).

The alveolar structures of the lungs are especially sensitive to X-rays. Extensive pulmonary fibrosis has resulted from doses of approximately 5.0 T.E.D., and in some instances the radiation reaching the lung amounted to only 2.5 T.E.D. A patient can survive with even an entire lung fibrosed, but elevation of the dosage above safe limits for the pulmonary structures frequently produces a radiation osteitis in the ribs, with pathological fractures. Palliative irradiation should be given with techniques which reduce such sequelæ to a minimum. In the author's clinic 15-cm.

portals are treated with 2,100 to 2,400r at the rate of 300r daily.

Improvement has been reported in approximately 25 per cent of breast cancer patients treated by surgical castration, and similar good results have been obtained with irradiation castration. The method is most useful in the presence of bone metastases and should always be tried in patients who have not reached the menopause. The author applies 600r to each of four 15-cm. portals, treating one area per day for four successive days. The menopause should be fully established about six weeks after completion of this therapy.

For controlling radiation sickness, mention is made of the barbiturates and vitamin B complex. The latter has been found effective not only in offsetting the ill effects of radiation but also in improving the general condition of the patient. Reference is also made to the possible value of pyridoxine hydrochloride (vitamin B₆) which has been found effective in controlling the nausea and vomiting of pregnancy. [For reports on the use of this preparation in radiation sickness, see papers by Van Haltern, by Oppenheim and Lih, and by Scott and Tarleton in *Radiology*, 47:377, 381, and 386, October 1946.—Ed.]

Following these general considerations, the author takes up the various types of lesions to be treated, as follows:

Large tumours of the breast incurable cases:—When large masses of malignant tissue have become necrotic and are producing a foul odor, surgical resection offers quick symptomatic relief. Often, however, these large tumors will

show marked shrinkage after irradiation. The multiple single-dose method through four to six sectors is quite satisfactory, but most radiologists prefer to crossfire the tumor through two or three portals, using a divided-dose tangential technic at 200 kv. Each portal may be given 2,100 to 2,400r at the rate of 300r per day to each area.

Involvement of the skin:—Skin metastases are almost always a bad prognostic sign. Occasionally radical treatment of a small single recurrent nodule is successful but the common surgical practice of removing one recurrence after another from the skin and subcutaneous tissues has little to commend it. The author prefers the implantation of low-intensity needles around the lesion in these cases and also in parasternal masses. In the presence of multiple nodules or cancer en cuirasse no type of treatment will cure the disease. Prolonged improvement, however, often follows the use of divided doses of X-rays generated at 200 kv. The entire anterior chest wall should be divided into 15-cm. squares, 1,800 to 2,100r being administered to each at the rate of 300r daily.

Metastases in the axillary lymph nodes:—For some reason which is not understood, cancer cells growing in lymph nodes are more resistant to irradiation therapy than the malignant cells found in the primary tumour. Axillary fat stands heavy irradiation very poorly and, although a combination of interstitial radium and a crossfire X-ray technic sometimes produces complete regression of cancer in axillary nodes, the resulting reaction is not justified in incurable

cases. Implanted radium needles or radon seeds must be used with great care, so that an excessive dose will not reach the brachial plexus.

Metastases in supraclavicular lymph nodes:—Control of isolated supraclavicular nodes with heroic external irradiation necessitates severe damage to the skin, subcutaneous tissue, and clavicle, and for this reason the author prefers radium needle implantation. Supraclavicular nodes have remained quiescent for three to six years following this procedure. Larger areas must be treated with external irradiation, using a divided dose technic over a single portal. The skin of the base of the neck is easily damaged with X-rays and the total dose should rarely exceed 2,000r. A rather severe reaction may be produced in the esophageal mucosa but this subsides shortly.

Skeletal metastases:—It has been known for years that relatively small doses of X-ray delivered directly to bone metastases of mammary origin often relieve pain and may produce a recalcification of the destroyed osseous structure. Striking results have been obtained by X-ray castration but no improvement has been observed following ovarian irradiation in any woman past the menopause. Relief of pain following irradiation castration and 600r delivered to each of two portals, crossfiring the bone lesion, usually begins in two or three weeks after the series is finished. Unfortunately results are not permanent but they often last one to three years. When pathologic fractures have occurred, X-ray therapy can be administered through windows cut in a plaster

cast, and good union has appeared after the completion of irradiation therapy.

Brain metastases:—For intracranial metastases some neurological surgeons advocate operative removal when other parts of the body are relatively free of the disease. However, the palliative results of irradiation are usually so good that this radical procedure seems unjustified. Relief of symptoms lasting from six months to two years has been observed, and the treatment can often-times be successfully repeated. The author's practice is to crossfire the affected portion of the brain through two or three portals when localization is possible. In other cases, the skull is treated through four triangular ports covering the entire cranial vault. Each area receives a daily dose of 300r and a total dose of 1,800r, only one area being treated per day.

Spinal cord metastases:—The symptoms of spinal cord pressure usually result from lesions growing from the vertebral bodies, but occasionally the metastases are within the neural canal. Treatment of the type used for brain metastases is frequently effective if it is applied before permanent damage occurs.

Intrathoracic metastases:—On the whole, the treatment of intrathoracic lesions with roentgen rays is unsatisfactory. This partially due to the fact that the patient is likely to be suffering from generalized carcinomatosis by the time intrathoracic metastases are well established. Generalized pulmonary metastases should never be irradiated because of the serious changes produced

in the lungs by efficient dosage. Occasionally it seems worth while to treat a single nodule when the patient is in good condition and other metastases are not demonstrable. Moderate doses may also be directed at the mediastinum with some temporary success when pressure symptoms from enlarged nodes produce severe distress. As a rule, better palliative results are obtained when irradiation of the thorax is omitted.

Intra-abdominal metastases:—Abdominal extension, also, indicates a generalized dissemination of the disease. Although some radiologists advocate irradiation therapy over the abdomen, particularly when the liver is enlarged, the author believes that the questionable improvement obtained in no way offsets the objectionable symptoms of irradiation sickness which invariably follow this form of treatment.

Several illustrative case histories conclude this comprehensive discussion. J. E. Whiteleather, M.D.—*Radiology*, Vol. 47, Dec. '46.

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Struma lymphomatosa, struma fibrosa and thyroiditis.—J. A. Schilling, *Surg., Gynec. & Obst.* 81: 533-550, November 1945.

There is generally some confusion in the various groups of non-specific chronic thyroiditis, i.e., struma lymphomatosa (Hashimoto), struma fibrosa (Riedel), and the pseudo-giant-cell type, or struma granulomatosa (De Quervain). It is the author's opinion that struma lymphomatosa is a definite clinico-pathological entity of unknown etiology while struma fibrosa and its pseudo-giant-cell variant

are different manifestations of the response of the thyroid to inflammation.

Struma lymphomatosa occurs between the ages of 40 and 60 and is limited almost exclusively to females. The predominant complaint is usually a goiter with vague pressure symptoms which has been present for a number of years. There is usually a history of recent acceleration of symptoms. The gland is diffusely enlarged and firm to moderately hard to palpation. It may be fixed to the trachea on swallowing and is seldom tender. The basal metabolic rate in the author's cases was—5 to—25 per cent. Microscopically there is a uniform degeneration of the acini with a diffuse infiltration of lymphocytes throughout the gland, in all cellular planes and between the acini. There are numerous areas of lymph follicles with their characteristic germinal centers composed of larger lymphocytes and reticulum cells with their mitotic figures.

Struma fibrosa and its giant-cells variant occur between the ages of 20 and 40, and predominantly, though not exclusively, in females (60 to 80 per cent). The symptoms are largely due to pressure; in the giant-cell variant there may be stabbing shooting pains in the shoulder, neck, and ear. The duration of symptoms varies from one to two years in the case of struma fibrosa and from one to twelve months in the case of the giant-cell variant. In 30 per cent of the cases the involvement is unilateral. The consistency is one of extreme hardness and a malignant growth is often suggested. There are usually dense, firm adhesions to the surrounding soft tissues in

struma fibrosa, while in the giant-cell variant this is usually not the case. Microscopically struma fibrosa presents a striking picture of hard, dense, hyalinized, straight, fibrous tissue, and little else at a casual glance. Epithelial elements, if they remain, are compressed; usually there is complete absence of acinar epithelium. In the giant-cell variety there is a marked increase in fibrous tissue that is hard, coarse, and often hyalinized, though to a lesser degree than in struma fibrosa. There is an acute degenerative process in the acinar epithelium and often many stages of this degeneration may be seen, varying from hyperchromatic nuclei to a coalescence epithelial cells with the formation of an intra-acinar cell mass or a pseudo-giant cell.

It is important to differentiate these conditions from malignant growths of the thyroid in order to save the patient from the postoperative complications which may follow radical resection of the gland and regional lymph nodes. Usually the malignant tumour is nodular, with an irregular surface, in contrast to the diffuse smooth enlargement in the conditions under discussion. There is also frequent invasion of adjacent tissues, with regional lymph node involvement. This condition may be quite difficult to distinguish from a late hard struma fibrosa. However, the diffuseness of the latter process, even if confined to one lobe, and its excessive hardness, serve to differentiate it from a malignant tumour.

Treatment should be aimed at relief of symptoms. A positive diagnosis is

essential. Thus biopsy, irrespective of the form of therapy, should be carried out as a preliminary procedure if there is any question of the diagnosis at operation, or if treatment solely by X-ray is contemplated. Röntgen irradiation alone, following biopsy, has given excellent results in struma lymphomatosa. It may almost be used as a diagnostic test. The response is rapid and the gland will shrink markedly in size in two or three weeks. Deep X-ray of adequate voltage is sufficient, up to 1,200 to 1,500 *r* on each side of the neck in divided doses of 100 to 200 *r*. Time must be allowed to elapse between courses of radiation to allow for skin tolerance of the dose administered. In one of the author's cases there was permanent regression of the gland after 800 *r* to each side of the neck. In another there was an excellent initial response to the same dose, but recurrence after six weeks required additional treatment, which was followed by a favorable result. The effect of X-ray therapy on pseudo-giant-cell thyroiditis may be sufficient to warrant its use. However, it is hard to evaluate, as this earlier, more acute form of thyroiditis often subsides spontaneously and without operation. X-ray therapy is ineffective for the late stages of fibrosis described under struma fibrosa.

Eleven case histories are included. A long list of references is appended. Alfred O. Miller, M.D.—*Radiology*, Vol. 47, Sep. '46.

Ankylosing Spondylitis—Symposium.
H. Wyatt, R. McWhirter, and Hernaman Johnson *Brit. J. Radiol.* 18: 301-308, October, 1945.

Following some introductory remarks by Wyatt, McWhirter presents a general discussion of ankylosing spondylitis of the Marie-Strumpell type. Clinical and radiological descriptions usually refer to advanced disease. Since, however, little or nothing can be done in the last stages, the early recognition and treatment are all-important. The onset is usually in the third decade, and males are predominantly affected. In a series of 168 cases, 91 per cent were males, and their average age at onset was twenty-six years. The cause is unknown. The rate of development varies from a few months to many years.

The first symptoms consist of fleeting pains in the back and hips, gradually becoming more constant and localizing in the lumbar region. On flexion the erector spinae muscles stand out prominently. There is tenderness over the sacroiliac joints and sometimes along the crests of the ilia. Chest expansion is restricted. The patient looks toxic, and the sedimentation rate is raised.

The first X-ray findings are blurring and irregular destruction of the sacroiliac joints with sclerosis of the adjacent bone. The spine at this stage may show no abnormalities. Only later is the "bamboo" spine demonstrable, with fixation of the hip and shoulder joints. As the disease advances, the posterior articulations of the spine are narrowed and indistinct and the margins of the vertebral bodies become sharp. Still later the anterior and lateral ligaments are ossified.

The first stage in the treatment is X-ray therapy. Treatment is given over

the sacroiliac joints and the entire spine. A total of 2,500 *r* (whether in air or with back-scatter is not specified) generated at 250 kv., with 1 mm. steel filter, is given in divided daily doses within two weeks. Irradiation relieves the pain and stiffness, but prolonged orthopedic treatment is an essential part of the management. The relief of pain produced by irradiation makes possible more effective exercise and massage.

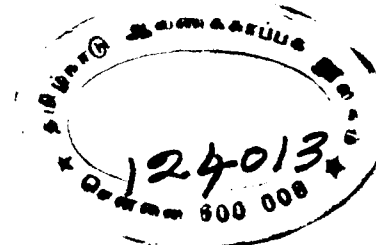
Hernaman Johnson discusses the prognosis of spondylitis in relation to treatment. As regards capacity to earn a living he finds the prognosis good. One paragraph from his paper may be quoted in full.

"Let us suppose then, that by some form of X-ray treatment we have made a patient symptom-free. What are his chances of so remaining? In early cases, when there is no loss of mobility but only pain, where there are only slight radiographic changes confined to the sacroiliac joints, the prospects of a long remission extending into years are good.

I have had one patient under observation for fourteen years, with no sign of relapse. Several young men treated in the years immediately preceding the war have since joined the Services. Some have been invalided; others remain fit for duty. A common experience at the Charterhouse Clinic is for a man to turn up after four or five years, stating that he has been quite well during all this time but has lately had a return of pain. He believes that 'a few treatments will put him right.' One looks up his record, and finds that, let us say, his pain had all disappeared within three months under X-ray treatment, and had, indeed, mostly gone in a matter of weeks. The patient is full of confidence; he expects this miracle to be repeated, and sometimes it is. But by no means always. His blood should be examined and any anemia combined. Then, the previous treatment may be tried, but if it does not seem to effective, no good can come from pushing it." Sydney J. Hawley, M.D.—*Radio-logy*, Vol. 47, Aug. '46.

List of Publications Received

- "The British Journal of Radiology and Radiography," London, January, February, March and April, 1947 issues.
- "International Medical Extracts and Reviews", Calcutta, March, 1947.



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Printed by Dr. U. KRISHNA RAO, M.S., B.S., Proprietor of the "Antiseptic Press,"
Madras and Published for the Indian Radiological Association by Dr. P. Rama Rao, General Secretary,
155-157, Ponnammallee High Road, Kilpauk, Madras.