

Radical Radiation Therapy of Mammary Cancer Using Electron Beams

Akira ASHIZAWA*

Department of Radiology, Medical College of Oita

Received for publication, July 26, 1982

Five cases of mammary cancer treated with radical radiation therapy³⁾⁴⁾⁸⁾¹¹⁾ using electron beams¹²⁾ will be discussed; this number corresponds to 2.2% of all the 229 cases to whom electron beams were irradiated for therapy of their mammary cancers for these thirteen years. The five cases include one patient in stage III, three in stage IV and who could not be subjected to surgical operation due to progressive conditions¹⁾, and one of Paget's disease (stage I). All the primary foci and relevant lymphatic glands were irradiated with electron beams. The patient of Paget's disease lived the life of 12 years and 5 months since the therapy by electron-beam radiation was started, although those in the progressive conditions lived only 8.8 months in average since the start of the therapy.

INTRODUCTION

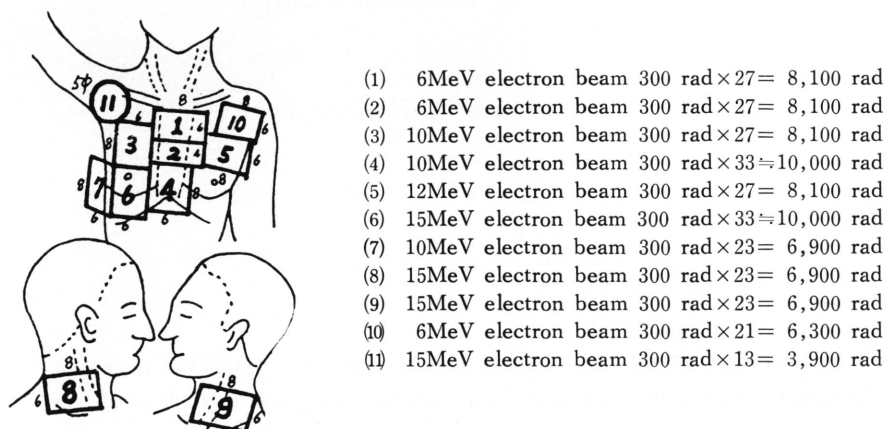
In Japan, post-operative radiation therapy is prevailing for therapy of mammary cancers; under such circumstances, the radical radiation therapy has not been applied to many cases in early stage of the disease, but to the patients in progressive conditions¹⁾. The reason is that many of the patients, especially, the old ones, dislike the hospital. Also there is found not a small number of patients who rejects undergoing a surgical operation. In Europe and America, particularly in France, the mass examination⁵⁾⁹⁾¹⁰⁾ is widely popular and many of patients with mammary cancers are thus found who are in early stage of the disease and are radically curable simply by means of the radical radiation therapy. But, this is a rare case in Japan.

Seemingly, it is a more critical thing for the women to lose her breast or breasts, than to lose the function of suckling. How wonderful it is if early detection of any mammary cancers is possible and so if the patients have only to be subject to tumorectomy³⁾⁴⁾ without the need of radical mastectomy and extended or super-radical operation.

In the period of thirteen years at my former hospitals, I could employ the radical radiation therapy to five cases. The results will be described in detail here, which I

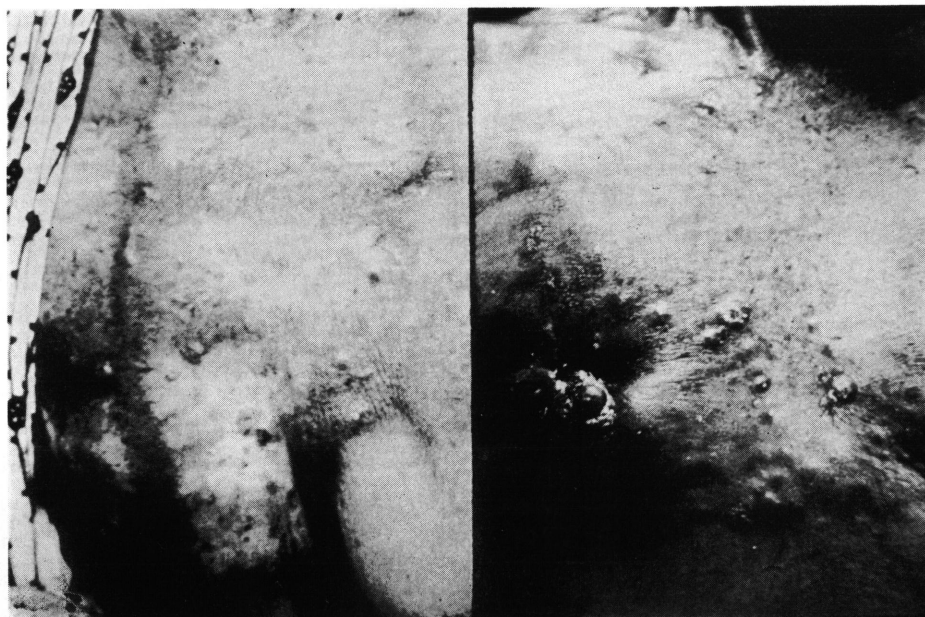
hope will be a help to the future radical radiation therapy of mammary cancers.

Case No. 1: M. I., 74 years of age, dead in 10 months and autopsy (stage IV)



(Fig. 1-a)

A tumor grew in the right breast 10 years before; she had found appearance of many nodules between both the breasts 6 months before. But she left them as they were because she has an unreasonable fear against the consulting with the doctor. During the examination of her, either the liver and spleen were palpable



(Fig. 1-b)

Right : Before radiation of the electron beams, cancers in the form of nodules were found in a group in the front chest wall.

Left : After the radiation, the cancers in the depigmented areas disappeared, but the cancers were found as scattered in the boundary area.

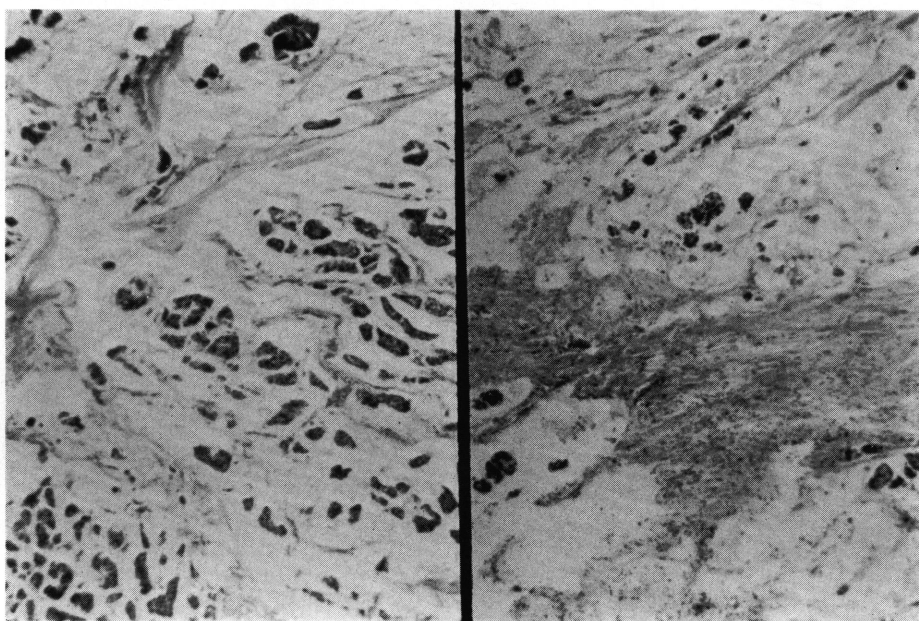
at 1.5-finger width distance. The axillary and right supraclavicularfossa lymphatic glands were found enlarged. The right eighth rib was found fractured and the right pleural effusion was also found.

Findings of tissues:

Metastatic mucinous carcinoma, skin

Anatomical findings:

Recurrent mammary cancer remained in the right chest wall; right cancerous pleuritis; cancerous pericarditis; metastasis to both axillary and right hilar lymphatic glands; metastasis of the cancer to the lumbar vertebra and both lungs; bronchopneumonia; arteriolar nephrosclerosis; right renal infarct; brown atrophy of the heart; radio-dermatitis of the chest wall.



(Fig. 1-c)

Right : Before the radiation, cells of cancer were found in the entire area of the specimen.

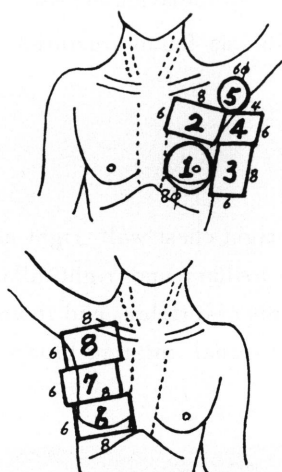
Left : After the radiation, the cancer cells were found only as scattered.

Case No. 2: M. K., 49 years of age, dead in 6 months and autopsy (stage IV)

Twenty three years before, she was subjected to surgery for therapy of mastitis. The left breast began to be deformed from one year before, suffering hemorrhage. She left it as it was with a fear that she was determined to have a cancer. Because of the whole body lassitude feeling, edema of the limbs and of the face looking pale, she visited my hospital.

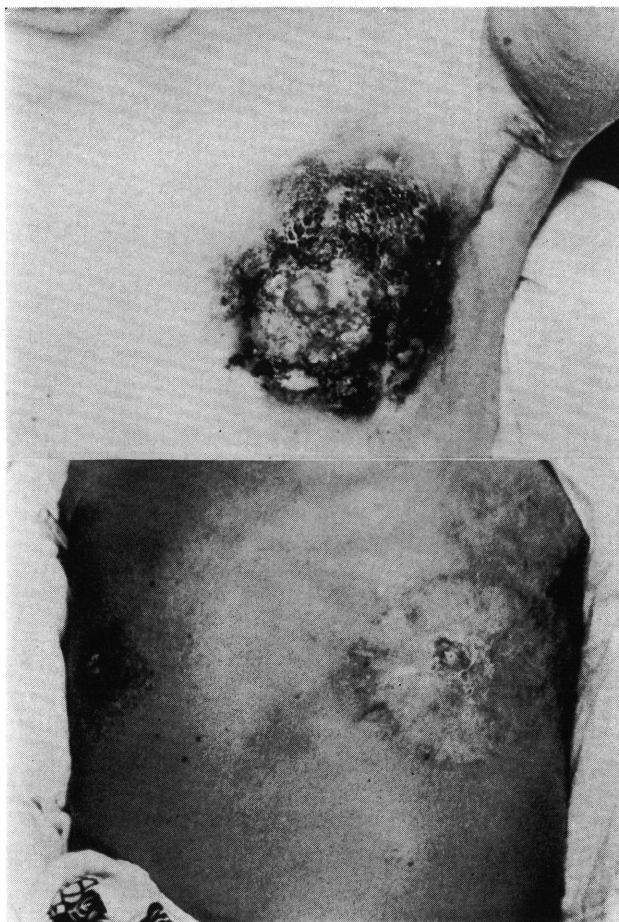
Findings of tissues:

Infiltrating ductal carcinoma, left mamma



(Fig. 2-a)

- (1) 12MeV electron beam 300 rad \times 30=9,000 rad
- (2) 12MeV electron beam 300 rad \times 20=6,000 rad
- (3) 12MeV electron beam 300 rad \times 20=6,000 rad
- (4) 12MeV electron beam 300 rad \times 20=6,000 rad
- (5) 15MeV electron beam 300 rad \times 20=6,000 rad
- (6) 12MeV electron beam 300 rad \times 20=6,000 rad
- (7) 12MeV electron beam 300 rad \times 20=6,000 rad
- (8) 15MeV electron beam 300 rad \times 20=6,000 rad

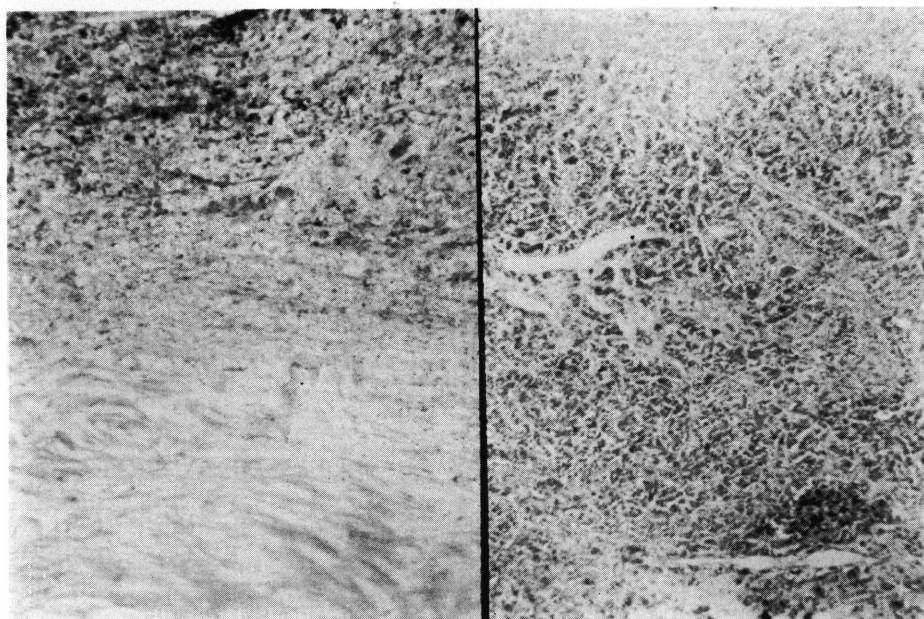


(Fig. 2-b)

Top : Before radiation
 Bottom : After radiation

Anatomical findings:

Metastasis to liver, sternums, backbone, tighbones, spleen, lungs, kidneys, suprarenal glands, myocardium, gallbladder, pancreas, uterus, ovary, lymphatic glands (in hilus of the lung, around the portal vein and in retroperitoneum); jaundice; vascular nephrosclerosis; multiple gastric ulcer; radio-dermatitis (in front chest wall and left axilla).

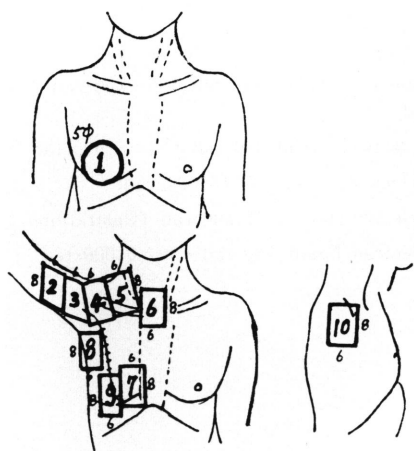


(Fig. 2-c)

Right : Before radiation, cancer cells are found in the entire area of the specimen.

Left : After radiation, the cancer cells are found as scattered only in a portion of the specimen.

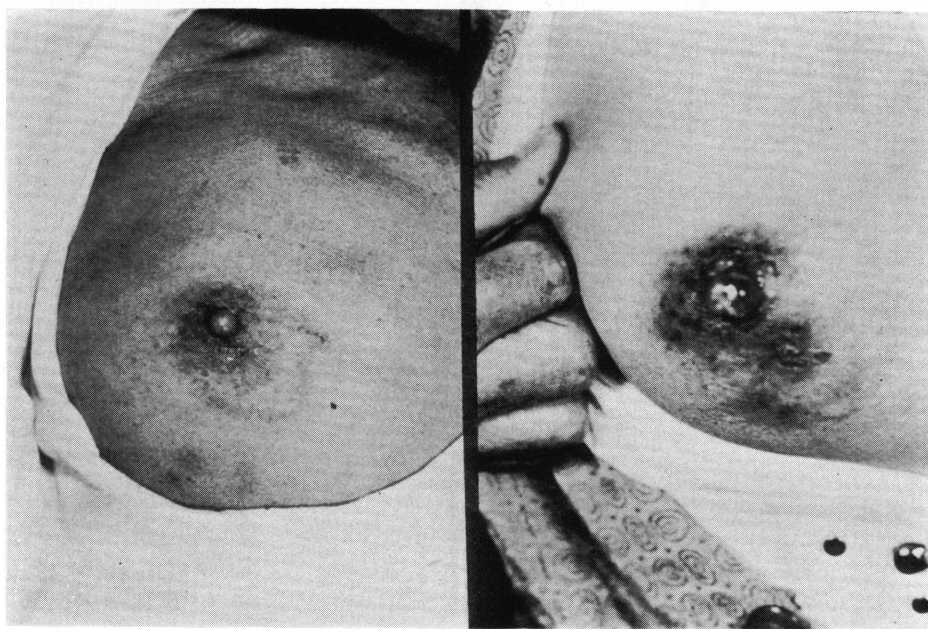
Case No. 3: K. C., 74 years of age, dead in 12 years and 5 months (Paget's disease, stage I)



(Fig. 3-a)

- (1) 8MeV electron beam 300 rad \times 25 = 7,500 rad
- (2) 8MeV electron beam 300 rad \times 17 = 5,100 rad
- (3) 12MeV electron beam 300 rad \times 17 = 5,100 rad
- (4) 8MeV electron beam 300 rad \times 17 = 5,100 rad
- (5) 12MeV electron beam 300 rad \times 17 = 5,100 rad
- (6) 8MeV electron beam 300 rad \times 17 = 5,100 rad
- (7) 7MeV electron beam 300 rad \times 17 = 5,100 rad
- (8) 7MeV electron beam 300 rad \times 17 = 5,100 rad
- (9) 6MeV electron beam 300 rad \times 17 = 5,100 rad
- (10) 8MeV electron beam 300 rad \times 17 = 5,100 rad

Hemorrhage was found from the right teat one year before. The sore on the teat was examined by biopsy and determined to be Paget's disease. She was subjected to the electron radiation therapy using Betatron, and cured. Two years and 2 months after that, a phyma was found in the right breast, and excised for radical therapy; it was found to be an infiltrating ductal carcinoma. After the surgery, she was subjected to the radiation of electron beams.

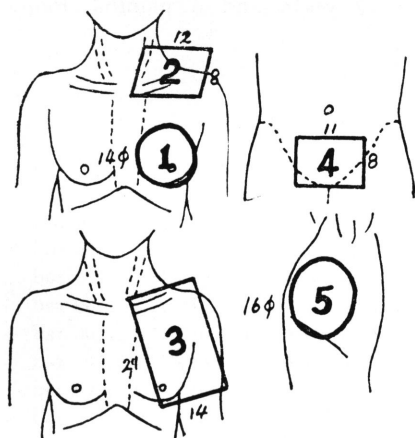


Left: After radiation

Right: Before radiation

(Fig. 3-b)

Case No. 4: K. M., 52 years of age, dead in 7 months and autopsy (stage IV)



(Fig. 4-a)

- (1) 12MeV electron beam $300 \text{ rad} \times 25 + 250 \text{ rad} \times 2 = 8,000 \text{ rad}$
- (2) 12MeV electron beam $300 \text{ rad} \times 23 = 6,900 \text{ rad}$
- (3) 10MV X-ray $200 \text{ rad} \times 30 = 6,000 \text{ rad}$
- (4) Telecobalt $300 \text{ rad} \times 5 = 1,500 \text{ rad}$ (Castration)
- (5) 6MeV electron beam $200 \text{ rad} \times 30 = 6,000 \text{ rad}$

Two years before, phymas began to appear around the breasts, and suffered

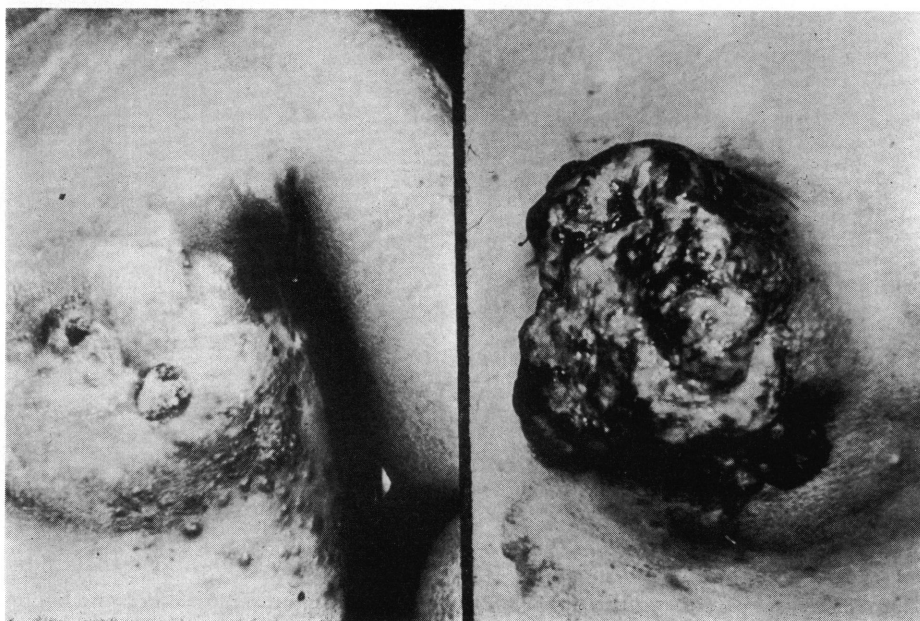
hemorrhage, with ulcer. However, she disliked the visit at the hospital, and stayed at home. As the phymas grew larger and larger and the hemorrhage would not stop, she finally got a fear and visited my hospital.

Findings of tissues:

Lobular carcinoma, breast

Anatomical findings:

Haemato-hydrothorax in amount of 1 liter in the left chest; many metastatic foci of a size like soy bean inside the pleura 1; metastasis also to the pericardium; pleura effusion; further metastasis to left orbit, liver and uterus.

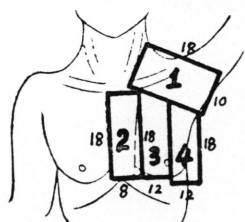


Left: After radiation

Right: Before radiation

(Fig. 4-b)

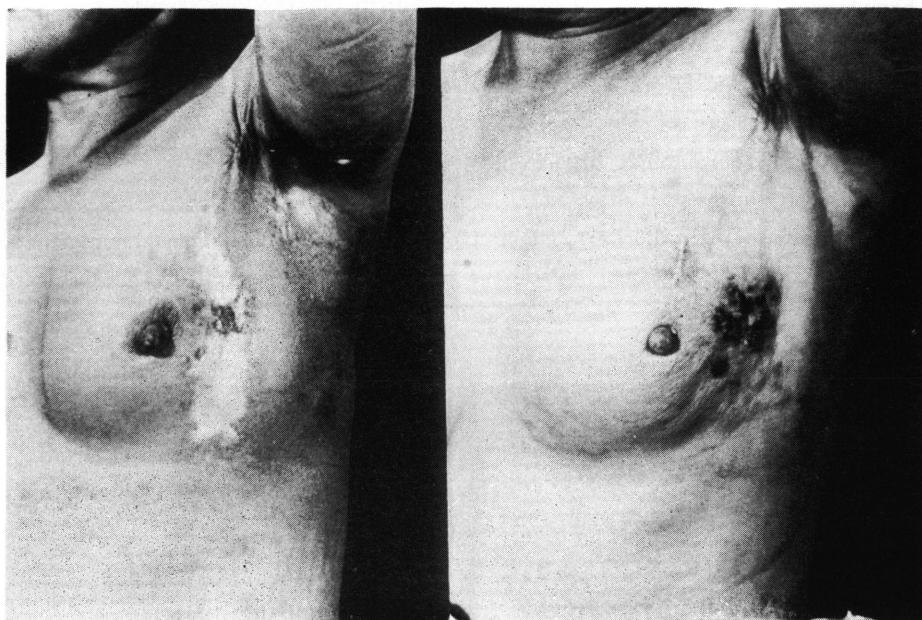
Case No. 5: N. S., 61 years of age, alive for one year (stage III)



(Fig. 5-a)

- (1) 12MeV electron beam 200 rad \times 30 = 6,000 rad
- (2) 12MeV electron beam 200 rad \times 30 = 6,000 rad
- (3) 12MeV electron beam 200 rad \times 30 = 6,000 rad
- (4) 10MeV electron beam 200 rad \times 30 = 6,000 rad

Three years before, a phyma grew in the left axilla, and excised. It was an adenocarcinoma though the primary foci was not known. She was administered



Left: After radiation

Right: Before radiation

(Fig. 5-b)

with Futraful at a rate of 800 mg/day as an out-patient.

Four months before, a tumor recurred in the left axilla. It was excised again, but the primary foci was not known.

In March 1979, reddish spots were found on the breasts and phymas were palpable; however, the phymas were in such progressive conditions that they could not be excised. After the ovary was extracted, radiation of electron beams was made. The phyma almost disappeared and cicatrized. After that, she had been administered with Picibanil, PSK, Futraful and Thiodrol; however, metastasis to the skins of chest wall and back occurred in many spots. When I recommended her to undergo the extraction of suprarenal gland, she changed the hospital from mine to another. At present, although a radiodermatitis and small pleural effusion, no metastasis to bones and liver is revealed by scintigraphy.

Findings of tissues:

Metastatic adenocarcinoma, skin of left chest

DISCUSSION

(1) The ratio of the patients to which I conducted the radical radiation therapy with all the patients who underwent the radio-therapy in the two hospitals where I formerly worked, A and B, is as follows:

Hospital A (period from January 4 1966 to April 30 1969 = 3 years and 4 months):

Radical radiation therapy/all radio-therapy of mamma carcinoma = $3/26 \approx 11.5\%$

Hospital B (period from April 1 1970 to May 22 1980=10 years and 1 month) :

Radical radiation therapy/all radio-therapy of mamma carcinoma = $2/203 \approx 1\%$

The hospital A is a one which is to treat the atomic disease, while the hospital B is a university hospital. Seemingly, the introduction to the patients of these hospitals depended in frequency upon the extent of recognition of the radical radiation therapy by the doctors in various hospitals and clinics or other facilities, who would introduce these hospitals to their patients.

(2) The five cases in consideration include one patient in stage III and three patients in stage IV; none of these patients in such stages were subjected to surgical operations. The remaining one patient of Paget's disease, which was the cancer in stage I (early stage, suffered from local recurrence and metastasis of the cancer in 2 years because the first local radiation of electron beams was at an energy as low as 8 MeV and no radiation was made to the relevant lymphatic nodules. After she was subjected to the surgical operation, radiation of electron beams was conducted, but she was regretfully dead in 12 years and 5 months. Even if the local region was suffering an early cancer, it was and still is necessary to sufficiently examine the disease by using scintigraphy²⁾⁷⁾⁸⁾ and CT scanning (however, such systems were not available at the time), and let the patient subject to a corresponding radiation therapy using electron beams.

(3) The case No. 5 was diagnosed to be adenocarcinoma by means of bioptic examination of the left axillary lymphatic gland twice for three years, but no primary foci was found in the breast. This was an unfortunate case. Before she was sent to the radiological department of the hospital, she should have been subjected to the precise examinations by means of scintigraphy²⁾⁷⁾⁸⁾, CT scanning and ultrasound tomography.

(4) Many of the cases who were already in progressive conditions¹⁾ when they visited the hospitals suffered from an ulcer in the center of a phyma, continuous hemorrhage and so were not free from anemia.

At the stage of radical radiation therapy in which the dosage of electron beams reaches 1,000 rad or so in energy, the primary effect will be eminent. Of course, the tumor will be reduced in size, and the hemorrhage be stopped with a rather great significance, anemia be eliminated and the general conditions of the patient be improved. Even if a complete curing cannot be expected because the patient is in progressive conditions, dehemorrhage is the most delightful and important thing.

REFERENCES

- 1) H.-J. SCHMIDT-HERMES, N. SCHMIDT: Zur Behandlung des progredienten metastasierenden Mammakarzinomas, *Strahlentherapie*, 145(3): 264-268, März 1973.
- 2) P. ANTTILA, E. NORDMAN: Control of radiation fields in breast cancer with lymphoscintigraphy, *Strahlentherapie*, 146(5): 559-561, Novem. 1973.
- 3) P. M. RISSANEN, P. HOLSTI: Vergleich zwischen konservativer und radikaler chirurgie, kombiniert mit strahlentherapie, bei der Behandlung des Brustkrebses im

- Stadium I, *Strahlentherapie*, 147(4): 370–374, April, 1974.
- 4) H.-J. FRISCHBIER, H. U. LONBECK: Die Strahlenbehandlung des Mammakarzinoma im Stadium I, *Strahlentherapie*, 147(4): 365–369, April, 1974.
 - 5) S. KÜGLER: Prinzipien der operativen Behandlung des Mammakarzinoms, *Strahlentherapie*, 147(6): 598–610, Juni, 1974.
 - 6) K. WÜRTHNER, W. SEEGER: Dosisverteilungen und Bestrahlungstechnik bei der Strahlenbehandlung des Mammakarzinoms im Stadium I, *Strahlentherapie*, 149(1): 29–40, Januar, 1975.
 - 7) G. ALTH, E. OGRIS: Lungenszintigraphische Langzeitbeobachtungen bei postoperativer Bestrahlung der Mammaryregion, *Strahlentherapie*, 149(1): 41–48, Januar, 1975.
 - 8) G. LUNDELL, E. MARELL, A. BÄCKSTRÖ, S. CASSEBORN, B.-L. Rudèn: Bone scanning with $^{99}\text{Tc}^m$ compounds in metastasizing Mammary carcinoma, *ACTA RADIOLOGICA*, 14(4): 333–336, August, 1975.
 - 9) S. JAKOBSSON, B. LUNDGREN, O. MELANDER & T. NORIN: MASS-screening of a female population for detection of early carcinoma of the breast, *ACTA RADIOLOGICA*, 14(5): 424–432, Oct. 1975.
 - 10) D. V. FOURNIER, H. KUTTIG, F. KUBLI, P. PRAGER, H. STOLPE, A. MAJIER, J. HÜTER: Wachstumsgeschwindigkeit des Mammakarzinoma und röntgenologische "Frühdiagnosen": *Strahlentherapie*, 151(4): 318–332, April, 1976.
 - 11) FLETCHER, G. H.: Textbook Radiotherapy, Second Edition, Lea & Febiger. Philadelphia, 1973.
 - 12) NORAH duV. TAPLEY: Clinical Applications of the Electron Beam, John Wiley & Sons. New York, 1976.