

## Cancer of the remaining breast: radiologic contribution to diagnosis

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Between 1953 and 1973 the mean incidence of a first breast cancer in northern Alberta was 0.47 per 1000 women. However, in women who had had a first breast cancer the crude incidence of a second primary cancer in the opposite breast was 1.3%. The rate of discovery of a second primary cancer increased after a multidisciplinary approach was instituted at the follow-up clinics.

Mammography has proved to be valuable in diagnosis. By this technique 19 (36.5%) of the 52 cancers occurring in the remaining breast were identified when they were clinically unsuspected.

Entre 1953 et 1973 l'incidence moyenne d'un premier cancer du sein parmi les femmes du nord de l'Alberta fut de 0.47 par 1000, alors que l'incidence du cancer du sein restant était de 1.3%. La fréquence du diagnostic d'un second cancer s'est accrue après l'institution d'une approche multidisciplinaire aux cliniques de poursuite.

La mammographie s'est avérée particulièrement utile, ayant, à elle seule, décelé 19 (36.5%) des 52 cancers du sein restant alors que l'examen clinique était négatif.

Cancer frequently occurs in the remaining breast of post-mastectomy patients,<sup>1</sup> and mammography is valuable for detecting the tumour.<sup>2-4</sup> The incidence of such disease has been studied in selected groups of patients whose composition has depended on the method of referral, type of hospital and other variables.

Byrne, Bringham and Gershon-Cohen<sup>2</sup> discovered six malignant tumours in 102 postmastectomy patients examined at 6-month intervals. Missakian, Witten and Harrison<sup>3</sup> found 10 occult cancers by mammographic examination and 15 by other means in a series of 397 examinations of patients who had had breast cancer. Stevens and Weigen<sup>4</sup> reported detecting cancer of the opposite breast in 30 of 210 postmastectomy patients in a 5-year period; nine cancers were recognized by both clinical and radiologic examination, three were occult and identified by mammography alone, and the remainder were diagnosed clinically.

We report the results of a study of cancer of the contralateral breast, discovered by different methods between 1953 and 1973 at the Dr. W.W. Cross Cancer Institute in Edmonton.

### Patients and methods

Compulsory registration of cancer patients in Alberta led to the establishment at this institute of follow-up clinics for patients who have had cancer of the breast. These clinics have dealt with all surviving patients registered during and after 1953, the few exceptions being due to the patient's age or infirmity. Between 1953 and 1965 clinical and laboratory assessments were undertaken routinely, and from 1966 mammographic examination of the opposite breast was done occasionally.

In 1971 reorganization of the clinics, with the initiation of a multidisciplinary approach, led to the regular use of mammography. From that time surgeons participated with radiotherapists in the assessment of patients with newly diagnosed breast carcinoma and in their follow-up. Four clinics a week for those with newly diagnosed disease and nine a week for follow-up of "well" patients were organized. In addition, weekly clinics for patients with metastatic disease were attended by surgeons, radiotherapists and internists. This resulted in systematic radiologic studies for metastatic disease and made possible a prospective study of the value of mammography in the follow-up of patients with a previous breast cancer.

Mammography was performed initially with an adapted tungsten-target portable 200-mA Picker unit. In the second half of 1971 this unit was replaced by a Senograph unit with a molybdenum target and "Anso Sandwich Pack" film. In 1973 xeroradiography with a tungsten target was begun.

For the last 3 years of the study the patients registered were assessed clinically and mammographically once a year. Patients registered before 1971 were progressively integrated into this program of yearly re-evaluation. The clinical and mammographic findings were independently recorded and, when relevant, were subsequently correlated with the pathological findings.

The clinical records of the patients in whom a second breast cancer was diagnosed were examined to determine if there was a family history of cancer in general and of the breast in particular.

The precise determination that a given cancer in the

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second breast represents another primary tumour rather than a metastasis or direct extension from the original primary tumour is difficult and, on occasion, impossible. Criteria suggested have depended on the location, histologic characteristics, presence of associated in-situ changes and absence of metastases.<sup>1,5,6</sup> The interval between the development of the two tumours has also been considered to be important.<sup>1,6</sup> In this study only cancers developing more than 6 months after the original mastectomy and in the absence of evidence of distant metastasis or local recurrence were considered nonsynchronous primary cancers. Data for other cancers, including those the pathologist considered secondary, were excluded from this report.

### Results

From 1953 to 1973 the number of women in northern Alberta increased from 279 000 to 426 000.<sup>7</sup> During that time a first breast cancer was detected in 3637 women, the mean incidence per 1000 being 0.47 (range, 0.30 to 0.57). The mean age at which the first breast cancer was diagnosed was 50.1 years (range, 33 to 81 years), and 69.2% of the patients were 50 or younger.

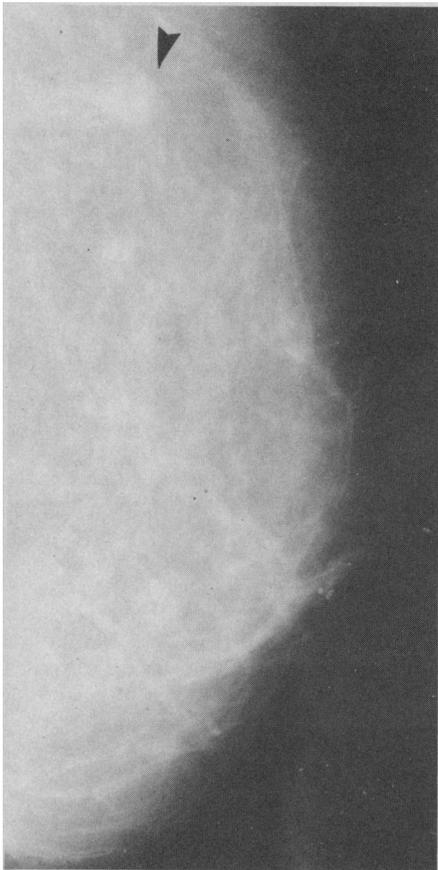
Among the 3637 women originally registered, a second primary, nonsimultaneous cancer developed in the opposite breast in 46, an incidence of 1.3% (6 patients whose first primary tumour was diagnosed before 1953 have been excluded) (Table I).

At the beginning of 1974, 1936 (53.2%) of the 3637 women were alive; 1323 (68%) had undergone careful follow-up and routine mammography between 1971 and 1973, some having had multiple examinations. The total number of mammographic procedures was 2126. Cancer

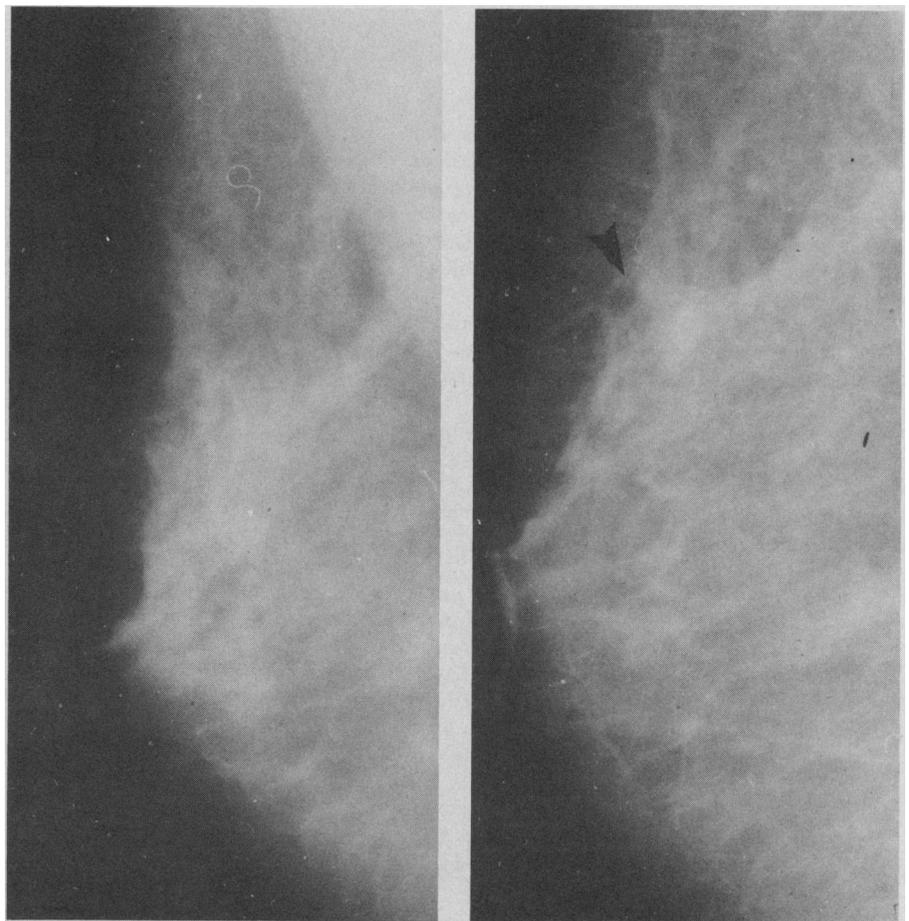
was discovered and confirmed histologically in 35 (2.6%) of the 1323 women. Some of the cancers were detectable clinically but 15 (42.9%) were diagnosed by radiologic methods alone and confirmed histologically. In most of these 15 cases recognition on the mammogram of a small neoplastic mass (Fig. 1) or a structural change (Fig. 2) led to the diagnosis. In four patients calcium deposits (Fig. 3) suggested the diagnosis of cancer.

**Table I—Incidence of first and second primary breast cancers in northern Alberta women**

Year	No. of women with first breast cancer	No. of women with second breast cancer
1953	104	1
1954	108	2
1955	97	4
1956	118	3
1957	127	0
1958	147	5
1959	121	2
1960	139	3
1961	171	3
1962	179	3
1963	173	4
1964	189	3
1965	177	1
1966	203	1
1967	197	0
1968	207	4
1969	229	0
1970	228	5
1971	246	1
1972	251	1
1973	229	0
Total	3637	46
Mean incidence	173	2.2 (1.3%)



**FIG. 1—Mammogram of left breast.** Right breast had been removed because of carcinoma. Arrow indicates small cancer (diameter, < 1 cm) not evident clinically but proven histologically.



**FIG. 2—Mammograms at 1-year interval.** Recognition of structural changes (arrow) in second mammogram (right) led to diagnosis of cancer, which was histologically confirmed.

The proportion of cancers of the remaining breast diagnosed before the institution of the systematic, yearly screening program was small (Table II). In the first phase of the earlier period, 1953-65, only 7 such cancers were detected, and in the second phase, 1966-70, during which mammography was performed occasionally, 10 primary cancers of the remaining breast were detected, 4 by mammography alone.

The mean interval between diagnosis of the first cancer and discovery of the second in the remaining breast was 15 years (range, 7 months to 23 years). Occurrence of the second primary cancer was a continuing threat, undiminished with time (Fig. 4).

The two cancers were symmetric as regards quadrant location in only 32.7% of patients (Fig. 5).

Of the 52 patients with a carcinoma of the remaining breast 52% had a family history of cancer in immediate relatives — specifically breast cancer in 17% and various types of cancer in 35%. Adequate information was lacking in 15% of patients, and the other 33% indicated a definite absence of a family history of any cancer.

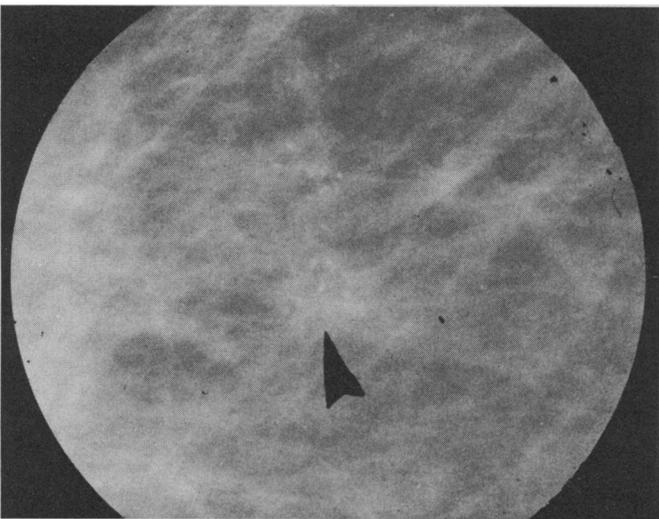
### Discussion

Although the female population of northern Alberta is small, the completeness of registration and organization of follow-up for patients with cancer justifies consideration of the data reported here.

The incidence of a second primary, nonsynchronous cancer of the opposite breast, 1.3%, is small compared with many of the figures from other reports,<sup>1,5,8</sup> which range from a low of 1.1% (Kilgore,<sup>1</sup> 1921) to a high of 6.5% (Robbins and Berg,<sup>6</sup> 1965).

**Table II—Number of second primary breast cancers detected in remaining breast during follow-up**

Follow-up procedure	Follow-up period			
	1953-65	1966-70	1971-73	1953-73
Clinical examination	7	2	6	15
Clinical and radiologic examinations		4	14	18
Radiologic examination		4	15	19
Total	7	10	35	52

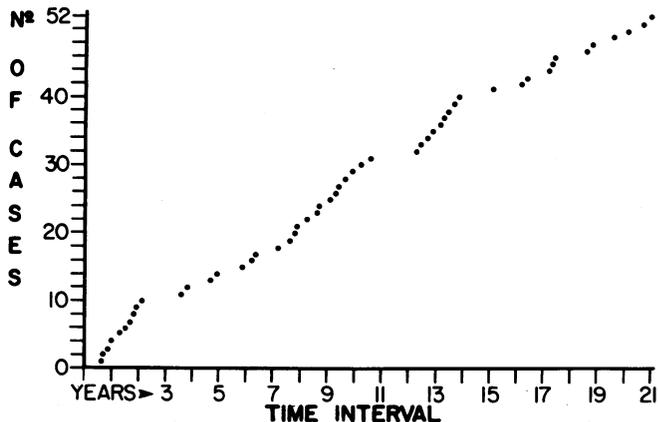


**FIG. 3—**Coned view from mammogram. Contralateral breast had been removed because of cancer. Calcium deposits in small, ill-defined density (arrow) suggested cancerous lesion, which was later proven histologically.

In this study, had the incidence of bilateral consecutive cancer been based on only those patients who had had a previous mastectomy, the population under consideration would have been smaller and the incidence greater — at least 2% — because the smaller figure was based on all survivors rather than the group of postmastectomy patients studied.

Previous attempts to involve specialists other than radiotherapists in the assessment and follow-up of patients with breast cancer had been unsuccessful. At the end of 1970 the surgeons of northern Alberta agreed to participate in such care. The impact of this change was considerable and can only be touched on here. One important effect was that it focused medical attention on this disease and allowed more uniform staging of its extent. Before their active participation the surgeons understandably had resented compulsory review of their patients by radiotherapists. Follow-up had been haphazard and undertaken by physicians of varied experience. The cooperation of several specialists led to a reduction in antagonism and a better mutual understanding of the contribution of each to patient welfare. The participation of surgeons in follow-up, coupled with the practice by which, whenever possible, a patient was followed by the same specialists, is believed to have contributed in part to the increased number of second cancers diagnosed.

It is also obvious that mammography, regardless of method, contributes greatly to diagnosis. In this group of patients it alone led to the diagnosis of 42% of all the second cancers detected in the 3-year period during which



**FIG. 4—**Cumulative incidence of second primary breast cancer, in remaining breast, by time after diagnosis of first cancer.

	FIRST Ca.	SECOND Ca.	
<b>SIMILAR QUADRANTS</b>			<b>32.7 %</b>
<b>SIMILAR HALVES</b>			<b>36.5 %</b>
<b>COMPLETE DISCREPANCY</b>			<b>28.8 %</b>

**FIG. 5—**Location of nonsynchronous primary cancers of the two breasts. In 2% the locations were undetermined.

it was used routinely. For how long such cancers would have remained clinically occult is a matter of speculation, as is the impact of such early diagnosis on the patient's prognosis. So far, these cancers seem to have behaved favourably: all but four of the patients were alive at the time of writing. The numbers, however, are too small and the follow-up too short to justify conclusions at this stage. Long-term follow-up is necessary to answer these questions. That many breast cancers grow slowly and spread late is well recognized.

The distribution of cancers in the remaining breast in this series appears to be as near random as possible, given the predilection of the disease for certain quadrants of the breast. These findings do not support blind biopsy of the second breast at the mirror-image site when primary cancer is diagnosed, a procedure that has been suggested.<sup>9</sup>

In terms of existing knowledge and practice, it is clear that the follow-up of patients who have had breast cancer requires continuing vigilance. No time can be established from this study beyond which such vigilance can be relaxed. Indeed, in patients with a family history of cancer in general and breast cancer in particular, this vigilance, when possible, should be increased.

The data presented here indicate that in selected high-risk groups the yield from mammography over and above

conventional methods of assessing the breast justifies its routine use. The data also confirm that mammography may lead to the discovery of otherwise occult cancers.

I am grateful for the assistance of Dr. B. Lentle and for the considerable help of Dr. Michael Grace and his staff in this institute in providing statistical data and analysis. The illustrations were kindly prepared by Mr. Karl Liesner and the manuscript by Mrs. V. Hutchison.

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