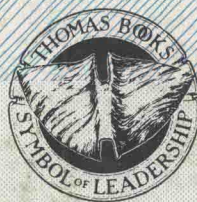


# XERORADIOGRAPHY: Uncalcified Breast Masses

**JOHN N. WOLFE, M.D.**

*Chairman, Department of Radiology  
Hutzel Hospital  
Detroit, Michigan*



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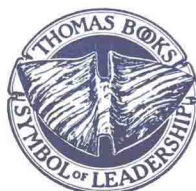


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## Xeroradiography: Uncalcified Breast Masses

I dedicate this book to my family and apologize for the time that it has taken me away from them.

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## Preface

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A RADIOGRAPH OF THE BREAST will often exhibit a mass or masses in which there are no calcifications to aid in the diagnosis. This book presents information and graphic material to assist the radiologist in arriving at a reasonable differential diagnosis when confronted with such images.

The order of presentation proceeds from the obvious malignancies, characterized by a mass with a well-developed spiculated margin, to the more subtle circumscribed carcinomas, such as the medullary or colloid variety, and finally, to the most difficult of all, those that do not present as a well-defined mass but merely present as an area of increased density. The section will conclude with a presentation of some less common forms of malignancies. Following the section on malignancies, benign tumors will be considered in some detail.

The format of presentation will be illustrations of the classic type of pathology followed by examples of variations. Finally, cases will be shown in which one simply cannot arrive at a correct diagnosis. The reader should not be discouraged by this latter category as the vast majority of cases can be correctly diagnosed. It is considered advisable, however, to present the pitfalls also.

The fact that one must not only regard the radiographic features of the mass, but also its "environment" and the historical features will be stressed repeatedly throughout the text.

The advisability of reexamination after varying intervals will be discussed, a practice which is thought to be of great value, especially when one is rather confident the mass represents a cyst, hematoma or breast abscess.

The book is not intended to discuss completely the field of mammography, but it should be considered a supplement to standard textbooks on the subject.

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## Acknowledgments

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A GREAT MANY PEOPLE contribute a tremendous amount of work toward writing a book. I want to express my sincere thanks to my office staff in particular Judy Brosch and Martine Jeza. Judy had the job of typing and re-typing the numerous manuscripts. Martine was constantly badgered to find specific case examples and to organize photographic material.

Without the cooperation of the Mammography Department staff, the quality of the illustrations could not have been achieved. I am indebted to Cornelia Steiman and all of her coworkers for affording me good images with which to work.

Elisa Petrini very attentively went over the text, rewriting much of it from the standpoint of sentence structure and punctuation. She has done, I believe, a good job.

I want to thank especially William Loranger, Ph.D. of the Xerox Corporation for the very early critique of the text. Doctor Loranger is the head of the Education Department of the Xeroradiography Program at Xerox, a close coworker and good friend of mine. His suggestions for revisions helped the text take shape.

I want to thank Mr. John Kroll for his usual good reproductions.

J.N.W.

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**Xeroradiography: Uncalcified Breast Masses**



## Introduction

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UNCALCIFIED BREAST MASSES constitute a problem in differential diagnosis. Simply stated, the vast majority of them represent benign lesions; a very small percentage are carcinomas. A conception of the ratio of benign to malignant can be gained by realizing that slightly less than two in 100 discrete, noncalcified breast masses represent carcinomas.

Stated differently, slightly less than 50 percent of breast carcinomas present radiographically as masses without calcifications. Within this group of carcinomas without calcifications is a small number which are very discrete masses. These include those of the medullary or colloid variety. The question is, how does one find the small number of breast cancers within a large group of discrete tumors, nearly all of which are benign. As will be shown, every bit of information from the history, physical findings and radiographic observations must be used in arriving at a reasonable diagnosis.

A secondary area of interest is found in distinguishing between the types of various benign tumors. That is to say, is the mass a cyst, fibroadenoma, papilloma, hematoma, etc.? This may seem to be a relatively unimportant exercise as anyone would be happy to simply differentiate the benign from the malignant. It is interesting, however, to be able to be definite and correct in the diagnosis of the benign tumors, and it is possible, in many instances, to do this with a high degree of accuracy. There is some importance in deter-

mining if the mass represents a cyst, because aspiration of a cyst's contents can often be the definitive treatment.

The problem will be discussed in an orderly sequence of subjects with appropriate illustrations. Hopefully, the end result will be that one can be confident in the diagnosis of a vast majority of these tumors as either benign or malignant. One should realize that there are a small number of cases where it is impossible to have a firm opinion of benign or malignant disease, and the problem of what to recommend in these cases will be discussed. Generally, if one thinks it is a cyst, aspiration can be recommended. If the strongest opinion is for fibroadenoma, then periodic reexamination can be suggested, if the surgeon does not care to remove it. Each case has to be individualized as to the recommendation made.

It should be stressed, however, that one has to be extremely careful that the radiographic report does not discourage biopsy. The physical findings of the experienced examiner play a great role in the determination of whether or not the patient is going to have an excision biopsy. The report should be so constructed, however, that the radiologist gives his best opinion. If his best opinion is for benign disease, then that should be stated firmly. The examining physician is the one who makes the decision whether to biopsy or not, and he must be aware of the limitations as well as the positive aspects of the radiographic examination.



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## Carcinomas

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THE DISCUSSION of the breast carcinoma which is not accompanied by calcifications will be divided into four parts, each of which corresponds to a particular type of carcinoma: (1) scirrhous, (2) nodular, (3) sharply circumscribed, and (4) noncircumscribed.

The key factors to consider in diagnosis concern the overall appearance of the mass, but especially

its margins; its "environment," e.g. if there is a prominent duct pattern, then all masses are more suspect for carcinoma than otherwise; the historical features including the patient's age, and whether or not the mass that represents the carcinoma is palpable. Additional information such as skin retraction, pain, enlarged axillary lymph nodes, etc. is used when available.

### SCIRRHOUS CARCINOMA

The term, *scirrhous carcinoma*, is used by the radiologist to connote a definable mass with a spiculated margin. It indicates that there is a considerable amount of connective tissue hyperplasia associated with the neoplasm. It is of passing interest that the spicules themselves may be composed solely of connective tissue or at times, a combination of connective tissue invaded by tumor cells. These spicules are characteristically short, usually from 2 to 10 millimeters in length but have been observed to be as long as 3 to 4 centimeters. They often extend to the skin and, in so doing, will produce retraction. (Figs. 1, 2, 3, 4, 5)

The scirrhous variety is the most common of the uncalcified breast cancers. It is the easiest to recog-

nize and leads to the greatest accuracy in diagnosis. It is very rare to see a well-developed mass with a spiculated border and have the pathologist report that it is not a carcinoma. The usual cause for this is sclerosing adenosis or, rarely, other tumors such as fibroadenoma or fat necrosis.

If the observations made from the mammogram were such as to permit a firm diagnosis of carcinoma and the pathologist states a carcinoma is not present, the specimen should be radiographed. Failing to find an unobserved mass there, the radiologist should recommend that the patient be reexamined at some future date to ensure that the mass was indeed removed.

### NODULAR FORM

This type of tumor is less common than the scirrhous variety. The carcinoma is characterized as a fairly well-limited mass with definable margins and no spiculation. Close inspection of it should reveal a faintly to rather well-pronounced nodular border. These tumors are often medullary carcinomas or simply carcinomas without a great deal of connective tissue hyperplasia. (Figs. 6, 7, 8, 9, 10, 11)

Nodular tumors tend to grow rather slowly. When their growth is observed over a period of time, what is most prominent on the interval examination is that they become more obviously malignant. That is to say, the faint nodularity present early in the stage of disease becomes more

obvious. Spiculation may also develop along a segment of the margin. (Figs. 12, 13) Experience in observing the growth of these nodular carcinomas is limited, but what has been seen has been consistent.

It is very important to discuss the palpability of carcinomas at this point. When one is dealing with a scirrhous carcinoma with considerable connective tissue hyperplasia, the tumor will typically feel twice as large as it appears on the image. The medullary variety of carcinoma is a rather soft tumor without connective tissue hyperplasia, so that a medullary tumor as large as 2 centimeters could very easily escape detection by physical examination. One must not use the rule that, if it is

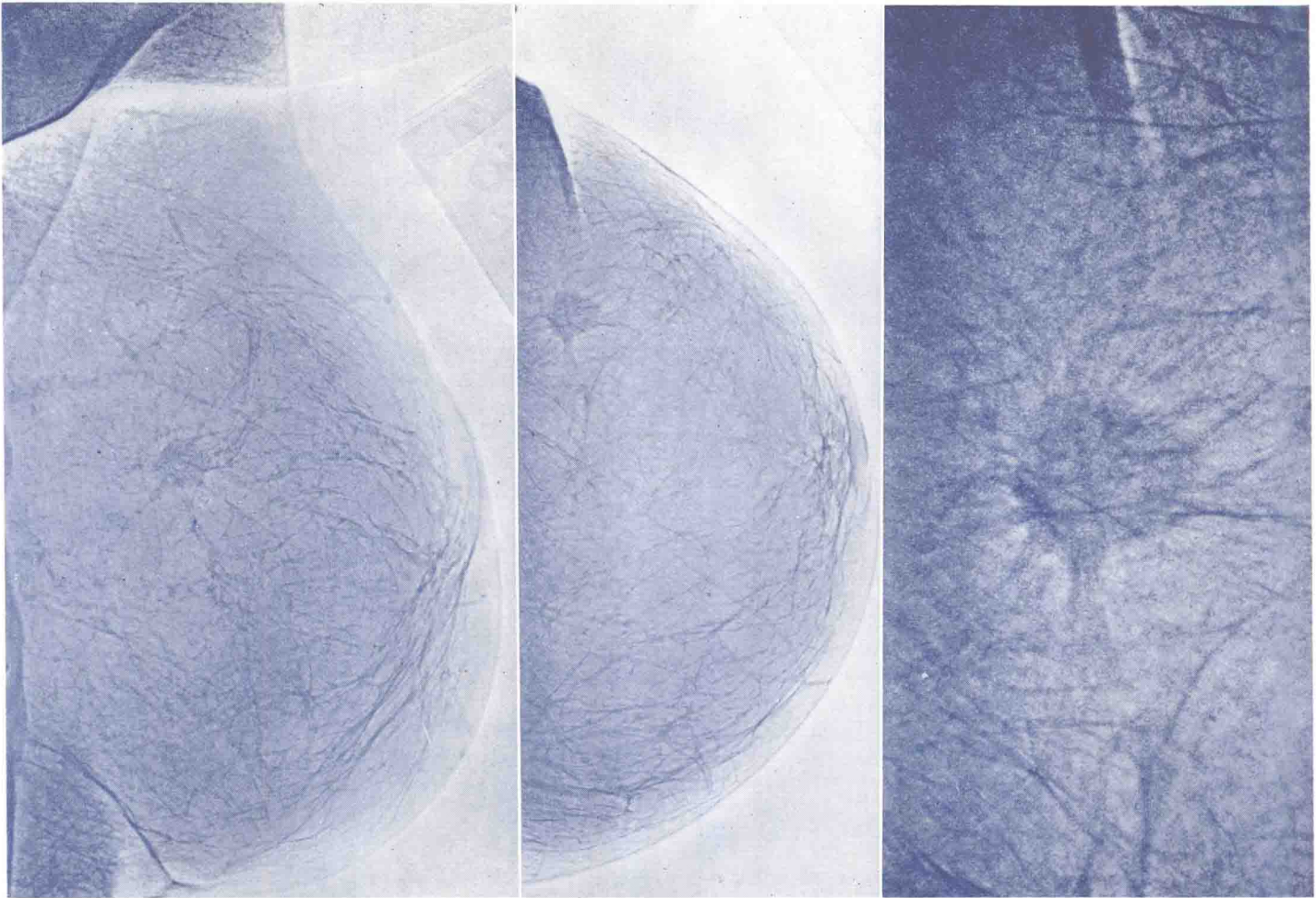


Figure 1.

**HISTORY:** A sixty-three-year-old, gravida 3 woman had had reduction mammoplasties on both breasts six years before examination. She complained of pain in both breasts and indentation of the skin on the left side below the level of the nipple.

**RADIOGRAPHIC OBSERVATIONS:** The mass with the spiculated margin was observed in the upper axillary quadrant of the left breast.

**IMPRESSION:** Scirrhus carcinoma.

**HISTOPATHOLOGY:** Carcinoma of the left breast.

**DISCUSSION:** The case is rather straightforward. The facts that the mass was non-palpable, caused retraction and had an irregular margin produced by spiculation lead to a firm impression of carcinoma.



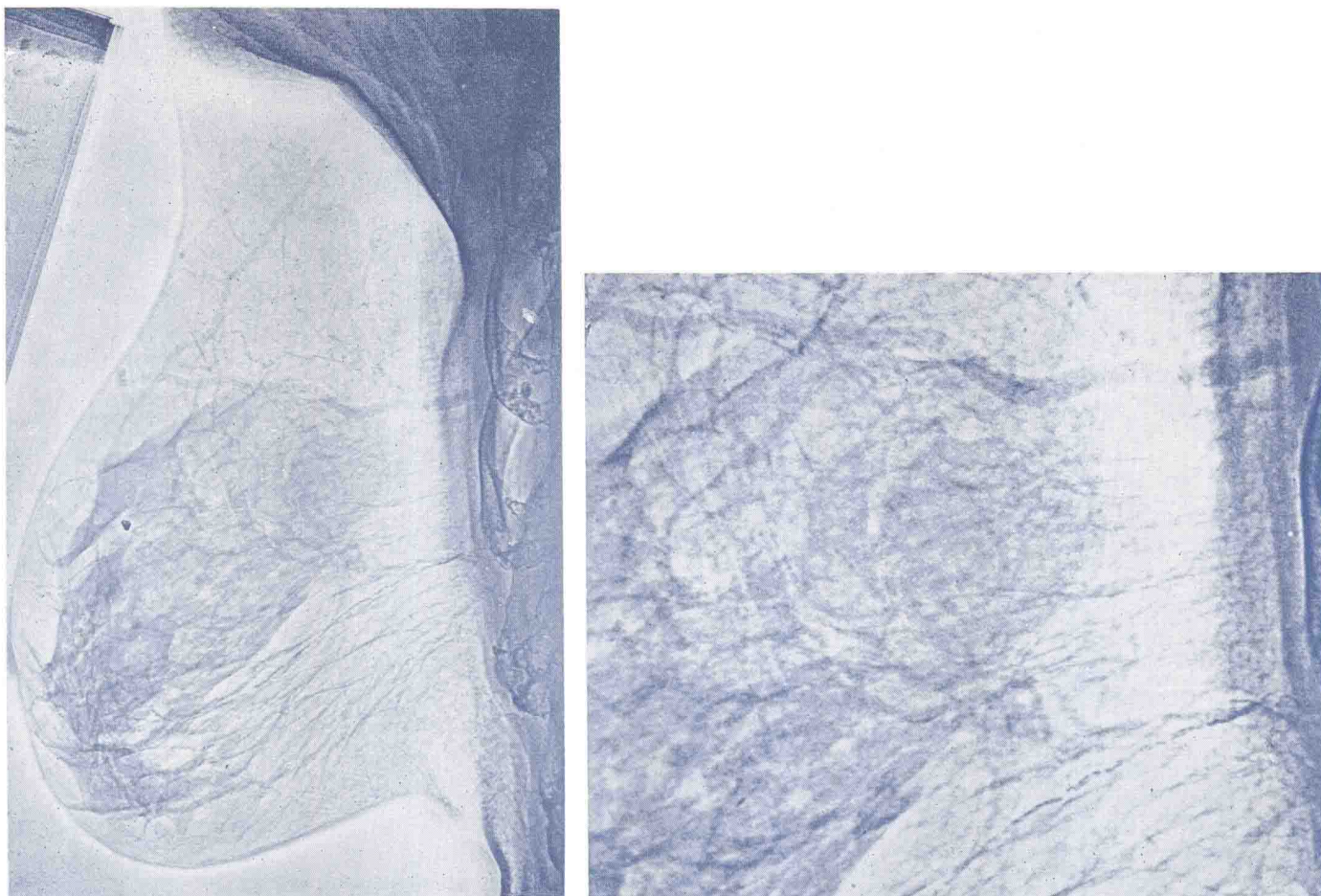


Figure 2.

**HISTORY:** A seventy-year-old, gravida 2 woman had slight thickening palpable in both breasts and no evidence of malignant disease from the physical examination. There are two studies separated by one year.

**RADIOGRAPHIC OBSERVATIONS:** (A, B) The breast was noted to be involved very severely with dysplasia and some element of a prominent duct pattern. Nothing was seen to suggest a carcinoma.

(C, D) One year later a spiculated density containing multiple small calcifications was observed. The spicules were very long, some measuring 2 to 4 cms.

**IMPRESSION:** (A, B) No evidence of carcinoma. (C, D) Strong radiographic evidence of carcinoma.

**HISTOPATHOLOGY:** Carcinoma of the breast with no metastatic disease to the axilla.

**DISCUSSION:** The case illustrates the difficulty of identifying some cancers even in retrospect. No carcinoma is evidenced on the first examination, even in the area shown to be malignant in Figure 2 C.



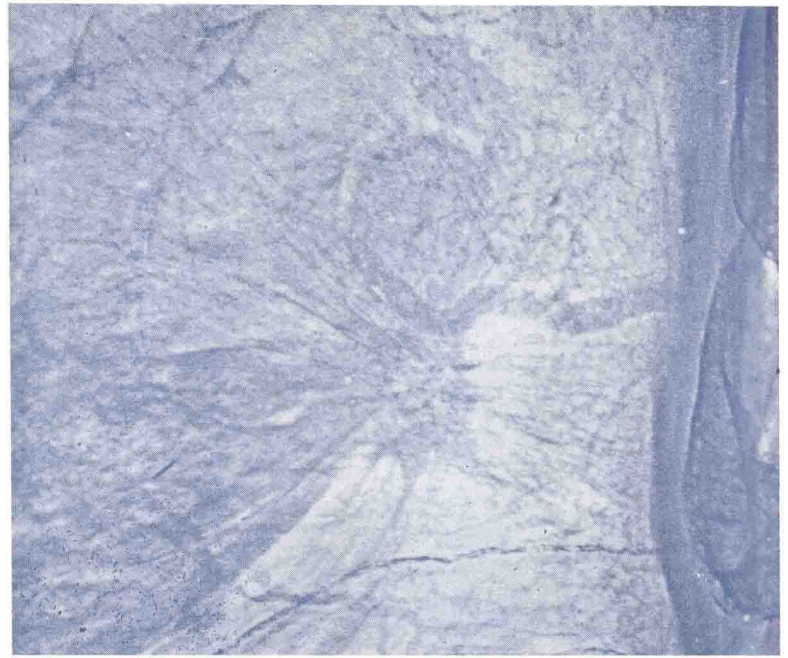


Figure 2 C-D (*Continued*)



Figure 3.

**HISTORY:** A sixty-six-year old, gravida 1 woman discovered a mass in her left breast which on physical examination appeared to represent a carcinoma.

**RADIOGRAPHIC OBSERVATIONS:** A bilateral symmetrical prominent duct pattern of moderate severity was noted. The mass was readily observed. On close inspection one can see that it has a very irregular margin with faint spiculation.

**IMPRESSION:** Strong impression of scirrhou carcinoma.

**HISTOPATHOLOGY:** Scirrhou carcinoma.

**DISCUSSION:** The case does not appear to pose any particular problem especially in view of the spiculated margin of the mass. That, together with the prominent duct pattern, should lead one into a firm diagnosis of carcinoma.



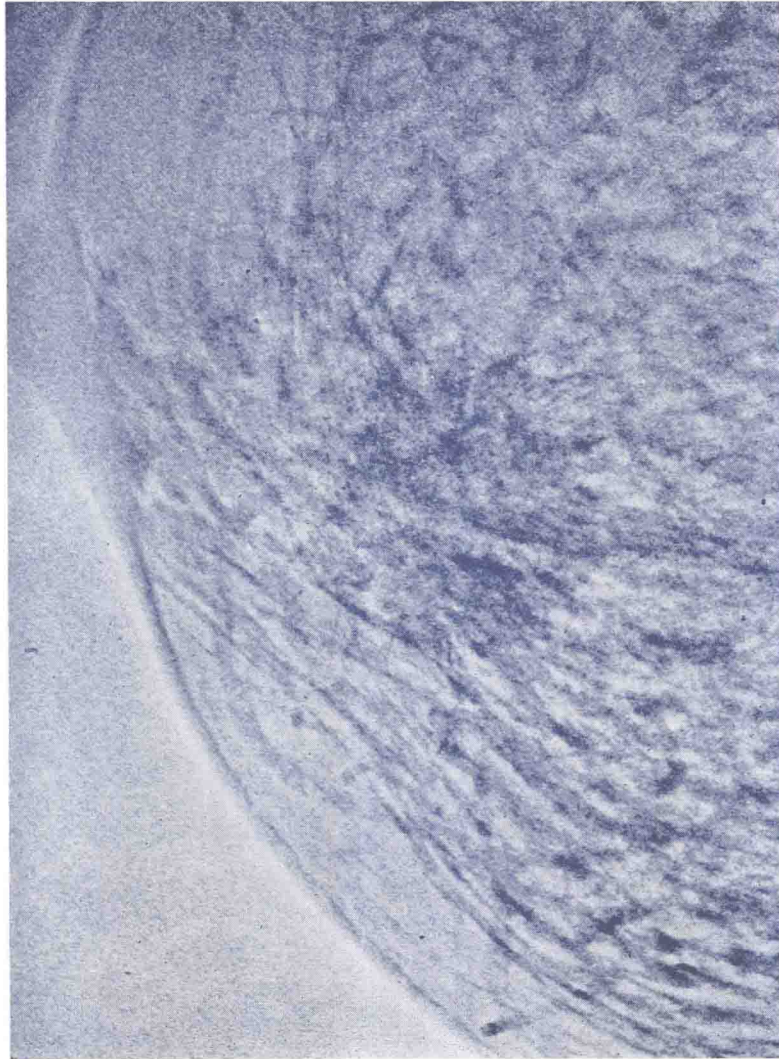


Figure 3 C (*Continued*)