A distinct lump in the breast is either clinically malignant or clinically benign. If it is clinically benign, exploration is indicated, and the pathology is determined from the gross specimen and frozen section. When the tumor is clinically malignant, it has been the rule in Bloodgood’s clinic (St. Agnes’ Hospital) to perform the complete operation for cancer without exploration. Clinically benign tumors occasionally prove malignant on exploration, while clinically malignant tumors sometimes prove to be benign. Clinically benign growths present no difficulty, as the majority of cases of cancer in this group are early ones, and a large percentage of cures is obtained by complete operation. Tumors which present clinical signs of malignancy but later prove to be benign are most frequently some type of mastitis.

The writer’s attention was directed to one type of mastitis in June 1925, when the following case came under observation:

A white woman, aged forty-three, married and the mother of seven children—the oldest twenty-two years old and the youngest two and one-half years—had a lump in the left breast, of which she had been aware for two weeks. There had been a watery discharge from the nipple for two days. Fourteen years before, the patient had suffered from caked breast, affecting the opposite breast. She was very stout, and the breasts were large and pendulous. In the mid zone of the upper, outer quadrant of the left breast was a palpable lump larger than a hen’s egg. It was hard, like cancer, and there was dimpling of the overlying skin when the breast was lifted forward with the patient either sitting or lying down. No enlarged glands were palpable in the axilla. The preoperative diagnosis was carcinom a of the breast, based on the consistency of the tumor and dimpling of the skin. The complete operation for cancer was done without exploration June 1, 1925.
A gross section of this breast is shown in Fig. 1, and microscopic pictures in Figs. 2 and 3. The gross specimen showed a diffuse lesion occupying about one-third of the breast. There were numerous dilated ducts from which comedones could be expressed. Between the dilated ducts the breast tissue was fibrous, and at one side there were friable areas which resembled cancer. The mass was hard, like scirrhous carcinoma. The glands in the axilla measured about 1 cm. in diameter. The frozen section showed no cancer, but chronic lactation mastitis. The glands were negative. Further sections later confirmed the frozen section diagnosis. The patient is now well more than six years later.

Note the numerous dilated ducts from which comedones are expressed, suggesting comedo-adenoma. The tumor is hard like scirrhous carcinoma. Between the dilated ducts the breast tissue is firm and fibrous and below there is a cellular area which looks like cancer.

Mastitis is not always a clinical entity. It sometimes masquerades as cancer, while cancer may masquerade as mastitis. A palpable mass in the breast is said to be of the mastitis type if it feels like the caked breast of the nursing woman. If such a mass is associated with lactation and accompanied by fever and leukocytosis, exploration is indicated, on the diagnosis of acute lactation mastitis. In the absence of these cardinal signs, such masses have been observed in advanced carcinoma, comedo-adenoma with or without carcinoma, chronic lactation mastitis, chronic diffuse
Fig. 2. Low-power photomicrograph of tumor (same case as Fig. 1), showing extensive mastitis without abscess formation; irregular lobules and ducts showing residual lactation hypertrophy, no carcinoma. P.N. 36680

Fig. 3. High-power photomicrograph of duct, showing marked periductal mastitis (same case as Figs. 1 and 2). P.N. 36680
traumatic mastitis, tuberculous mastitis, and in two types of chronic cystic mastitis—the shotty breast and diffuse dilatation of the ducts with mastitis.

In studying sections of mastitis cases not associated with lactation, I have been unable to find any case of acute or chronic mastitis, except in association with cancer, tuberculosis, diffuse dilatation of the ducts in chronic cystic mastitis, following trauma with a needle, or in association with hematoma after injury. It would seem, therefore, that mastitis is periductal or periacinar, and is associated with dilatation of the ducts in chronic cystic mastitis, with lactation hypertrophy (Fig. 3), or with trauma, tuberculosis, or cancer.

In the majority of patients advanced carcinoma is associated with a carcinomatous dermatitis and metastatic skin nodules or other evidence of metastases, though this is not always the case. Tuberculous mastitis and the diffuse dilatation of ducts in chronic cystic mastitis associated with periductal mastitis before the abscess stage, both feel like caked breast. In the shotty breast of

Fig. 4. Gross Section through Breast the Seat of Advanced Carcinoma.
P.N. 37342

This tumor was clinically malignant, and on palpation suggested mastitis. The complete operation for cancer was done, without exploration. Sections showed carcinoma. Metastases occurred to base and mid-glands. Death ensued after one year and eight months, from cancer.
PLATE I

LARGE ABSCESS OF BREAST IN PATIENT AGED THIRTY-TWO YEARS, WHOSE YOUNGEST CHILD WAS TEN MONTHS OLD.  P.N. 11116

Symptoms were of two months' duration and the case was clinically benign. Amputation of breast by Dr. Bloodgood.
chronic cystic mastitis, the mass usually extends to the periphery of the breast, has an edge like a saucer, and can be lifted up like the edge of an enlarged liver.

In chronic lactation mastitis the tumor begins as an area of induration. When explored early, it is found to be a solid, non-encapsulated area firmer than the surrounding breast tissue. If exploration is delayed, the induration either disappears spontaneously, goes on to suppuration, or remains as a residual tumor. Chronic lactation mastitis is characterized microscopically by evi-

![Photomicrograph of Chronic Lactation Mastitis](image)

FIG. 5. PHOTOMICROGRAPH OF CHRONIC LACTATION MASTITIS, SHOWING EXTENSIVE LACTATION HYPERTROPHY. P.N. 41422

Exploration was done and a diagnosis of cancer made from frozen section. The complete operation was performed immediately. The specimen was later sent to the laboratory and the sections show chronic lactation mastitis; no cancer.

dence of lactation hypertrophy—varying from the fully developed lobule of lactation to small areas of residual lactation hypertrophy (Figs. 2 and 5)—associated with infection.

Microscopically, lactation hypertrophy has frequently been interpreted as carcinoma (Fig. 5). It must be differentiated, also, from the pseudo-lactation hypertrophy sometimes seen in carcinoma (Figs. 6 and 7). The infection may be simply an area of chronic inflammation in which small lymphocytes predominate (Fig. 2), or there may be an abscess varying in size from one visible only
Fig. 6. Low-power Photomicrograph of Highly Malignant Carcinoma, Suggesting Lactation Mastitis. P.N. 40422

Fig. 7. An Area from Section Shown in Fig. 6 Under High-power: Carcinoma Suggesting Lactation Hypertrophy. P.N. 40422
Compare with area of lactation hypertrophy in Fig. 5
under the microscope to the large abscess in which fluctuation can be elicited (Plate 1).

Areas of residual lactation hypertrophy may be present in a breast many years after lactation. A tumor may follow a lactation mastitis immediately or may appear some time later. The longest interval in our series between lactation and the appearance of a tumor showing lactation hypertrophy was fourteen years. The tumor in this case was clinically an abscess, and the sections showed lactation mastitis. In the group about to be analyzed there was a history of previous lactation in 35 of the 43 cases. In 8 cases there was no note on lactation, but it is our opinion, from a study of the sections, that in every case there had been previous lactation.

In 1925 there were recorded in the Surgical Pathological Laboratory at Johns Hopkins 34 cases of chronic lactation mastitis. To that number 9 have been added in the past six years. This gives us 43 cases for study. During the forty years from March 1890 to March 1930, 3,506 breast cases were recorded in the laboratory. The incidence of chronic lactation mastitis, therefore, is 1.2 per cent.

The first case to come under observation in the Johns Hopkins Hospital was in 1892. In this case there was an abscess, which was incised and drained. Following this there were two cases which were clinically malignant, and in which the complete operation was done. The fourth case to come under observation (Fig. 8) was clinically questionable. Dr. Finney incised an abscess and removed a
piece of the wall; a diagnosis of adenocarcinoma was made, and Dr. Halsted performed the complete operation. The patient remained well for twenty-two years and was later lost track of. The sections, which are still in the laboratory, show lactation mastitis, but not cancer (Fig. 9). Of these four cases, then, the first was clinically benign because of the presence of an abscess; the other three were treated as cancer on erroneous clinical or microscopic evidence. A consideration of the entire group of 43 cases included in this analysis brings to light a similar state of affairs.

Of the 43 cases 24 came under observation in the stage of abscess or sinus formation; in 23 the abscess was incised, excised, or treated by excision of the breast only. In one case the tumor was explored, a piece of the wall excised, a diagnosis of cancer made as in case four (above), and the complete operation performed. The tissue was referred to the laboratory for diagnosis and shows that what was interpreted as cancer was really lactation mastitis (Fig. 5).

Subtracting the 23 cases which were clinically benign, because of abscess or sinus formation, from the group of 43 cases, there
remain 20 cases which were clinically malignant or clinically benign without abscess or sinus formation. In 15 of this group (75 per cent) the complete operation was performed; in 5 (25 per cent) the tumor only was excised.

Sections from these cases have been studied and no evidence of malignancy has been found in any of them. All show evidence of residual lactation. The majority of the patients have been heard from, and among these there have been no deaths from cancer. Of the 5 cases in which only the tumor was excised, one was clini-

Fig. 10. Photomicrograph of Residual Tumor, Seventeen Months After Lactation. P.N. 19982
Note thick walls of ducts from old mastitis

...ically malignant and 4 clinically benign. The tumor which was clinically malignant was in the lower hemisphere of the right breast, just beneath the periphery of the areola and adherent to the skin of the areola. On lifting the breast forward a dimple appeared over the tumor. The palpable mass measured only 1.5 × 1 cm. Dimpling has usually been a sign of malignancy, especially in small tumors. This tumor was explored by Dr. Bloodgood in November 1927, and the frozen section showed no evidence of malignancy. The tumor only was removed.

The 4 cases which were clinically benign are the only examples of clinically benign tumors not in the stage of abscess or sinus
formation in the group of 43 cases. The first patient was a married woman, twenty-four years of age. The tumor had appeared at the age of twenty-one, during her only lactation. Operation was performed Oct. 1, 1902, consisting in excision of a zone of breast tissue only. The section (Fig. 10) was later submitted to eleven pathologists, eight of whom diagnosed the condition as benign, one as cancer, and two as questionable. The patient was last heard from five months after operation. In 1913 a letter addressed to her was returned, marked "dead," but it has been impossible to ascertain the cause of death.

The second of these patients was a woman thirty-five years of age, the mother of three children. The youngest child was seventeen months old and the tumor had been present seventeen months. It was an indefinite mass and was getting smaller. Operation was performed Aug. 16, 1916, by Dr. Bloodgood, the tumor only being excised. The sections showed evidence of old mastitis. The patient was last heard from in May, 1927. At that time she had been well eleven years.

The third patient was a woman aged thirty-six, the mother of two children, aged eleven and nine. The tumor, an indefinite residual lump, had been present ten and a half years when it was excised in August 1916 by Dr. Bloodgood. The section showed residual lactation. The fourth case was also a residual lump after lactation mastitis. Prior to operation Dr. Bloodgood had made note of the fact that the tumor was soft and doughy and did not feel like cancer. The patient was examined four years later and was well.

Each of these four women had a more or less indefinite lump in the breast dating from lactation. In two instances the tumor was an indefinite mass, in another it was soft and doughy, while the fourth patient was only twenty-four years of age—at the onset of the tumor only twenty-one—young for cancer.

Of the entire group of 43 patients, the youngest was a colored girl, aged eighteen, and the oldest a woman aged forty-eight; 78 per cent of the patients were under forty years of age, and 69 per cent under thirty-five. The ages in this group overlap the ages in the cancer group, but the average age is considerably lower.

Chronic lactation mastitis seems to have no relation to the number of lactations. In all but 12 of the records of these cases there is a note on lactation. In 7 lactation occurred only once, in 7 twice, in 17 more than twice and in 8 of these six or more times.

A study of the age of the youngest child reveals that in 11 cases
this was less than six months and in 9 from six months to one year, making 20 instances in which the youngest child was less than one year old. Deducting from the 43 cases the 8 cases in which there is no note on the age of the youngest child, we find that the youngest child was less than one year old in 57 per cent of the group.

The tumor in the breast may, or may not, date back to a previous acute lactation mastitis. In only 9 of the case records is there a note on a previous mastitis. Since in two cases the mastitis was in the opposite breast, there may be said to be a history of previous lactation mastitis in only 16 per cent of the cases. The longest period that had elapsed since the occurrence of the acute mastitis was twenty-eight years, and in this case the residual tumor had been present twenty-eight years. The most recent history of mastitis dates back only three months, and in this case the tumor was first noticed on examination of the patient, who was not aware of its presence.

This brings us to a study of the duration of the tumor. In 8 patients the tumor had been present two years or more, and in the clinically malignant group 4 of the 15 patients had a tumor of over five years' duration. One of these tumors had been present twenty-eight years; one twenty-nine years; one six years, and the other five years. We should, I believe, explore these tumors of long duration, unless there is some definite contraindication. In 5 of the cases the duration of the tumor is given as under one month. Four of these were clinically benign because of the presence of an abscess or sinus. In one instance (Figs. 1 and 2) the tumor was clinically malignant, because of dimpling of the skin. When we consider, however, that this tumor had been present only two weeks and that it was larger than a hen's egg at the end of so short a period, it would seem that the evidence against cancer was sufficient to warrant exploration and frozen section; that in the future more reliance should be placed on the history, and that those cases should be explored in which there seems to be incompatibility between the history and physical findings.

Remarks

by Joseph Colt Bloodgood

The cases described above, of which Dr. Cohn has made an independent study, are recorded in the Surgical Pathological Laboratory of the Johns Hopkins Hospital, the material having been
collected from the Surgical Clinics of the Johns Hopkins Hospital, the Union Protestant Hospital (now the Union Memorial Hospital), St. Agnes' Hospital, and other surgical clinics throughout the country.

The gist of the study is contained in the statement that of 20 patients with non-suppurative, chronic lactation mastitis, 15 or 75 per cent underwent the complete operation for cancer, either with or without exploratory incision, and with or without frozen sections, and that in many of these cases the first diagnosis made from the tissue received in the laboratory was cancer.

Dr. Cohn has reported here the case of a woman seen in 1925 with a lump in the breast which felt like cancer and gave the clinical signs of cancer—dimpling of the skin—and for which he did the complete operation for cancer, but which proved on frozen section to be lactation mastitis (Figs. 2 and 3). Had an exploratory incision been made in this case the breast could have been saved, even though the tumor was clinically malignant.

More than thirty years ago I learned that in the wall of an ordinary chronic abscess in the lactating breast, the microscopic appearance was difficult to differentiate from cancer (see Fig. 9). Twenty years ago, in re-studying and verifying cases of cancer of the breast in which the patient had lived five years or more after operation and was still apparently free from recurrence, I encountered one in which the preoperative photograph of the patient showed an enlarged breast with retracted nipple, irregularities, and multiple dimpling. The description of the gross specimen was that of a breast completely involved by an infiltrating cancer, without evidence of suppuration, and with enlarged axillary glands. The microscopic diagnosis was infiltrating scirrhous carcinoma with metastasis to the glands. Had this actually been carcinoma, it would have represented the most advanced example of cancer of the breast in which the patient had remained well five years after operation. A re-examination of the sections of the breast and the glands, however, compelled me to change the diagnosis to chronic lactation mastitis without metastasis to the glands. The case was thus identical with the one reported by Dr. Cohn.

The differentiation of chronic lactation mastitis from cancer was made possible by a study of the sections of the walls of breast abscesses which had been excised when the abscess had been drained. These sections showed just as much evidence of cancer as the non-suppurative group in which the complete operation for
cancer had been done. It required, however, a number of years before enough material had accumulated to allow us to realize the difficulties and to master microscopic differentiation.

Now, in 1932, after over forty years’ experience, we are able to compare the sections of the involved breasts in 20 cases of non-suppurative lactation mastitis with 23 in which there were one or more abscesses. In the presence of an abscess, there is a zone of granulation tissue between the pus and the breast, then a zone of chronic lactation mastitis, then a zone of lactation hypertrophy. The stage of this lactation hypertrophy depends upon whether or not a child is still being nursed and, if not, upon the duration of time since nursing ceased. It is important to record here, however, that lactation hypertrophy may persist as long as fourteen years after nursing, and may be found in carcinoma as well as in mastitis. I have never seen lactation hypertrophy in chronic cystic mastitis.

The presence or absence, in the frozen section, of lactation hypertrophy is, therefore, of no aid in excluding cancer. We must learn to distinguish the two conditions in the frozen section. The study of these cases by Dr. Cohn shows that chronic lactation mastitis may assume the clinical picture of cancer. The area is an infiltrating one and may feel like cancer. There may be retraction of the nipple and one or more areas of dimpling of the skin, even up to infiltration of the skin. If a definite abscess is found, this, as far as my studies go, excludes cancer. It is when no sign of pus exists that gross differentiation is difficult and reliance must be placed upon the frozen section.

This paper by Dr. Cohn is the beginning of a series of papers which will attempt to present the border-line tumors of the breast. The most important illustration for these papers is the photomicrograph. Since we have accumulated a very large number from cases in which five years or more have elapsed following operation, we are able to report on exact results.

As more and more women seek advice when they first feel a lump in the breast, we are able less and less frequently to make a clinical diagnosis. Even when the tumor is removed and is bisected, we are finding it increasingly difficult to distinguish the non-encapsulated area. In the blue-domed cyst and in the distinctly encapsulated tumor of the breast a gross diagnosis is as safe as a microscopic. In all other cases we must depend upon the frozen section, which requires far greater experience than most
pathologists possess. Chronic, non-suppurative lactation mastitis, whether of recent origin, or appearing after months or years as a residual lump, is always a border-line condition, and the differential diagnosis can be made only in the frozen section. In some instances, even then it seems impossible to decide between benignancy or malignancy. The only thing our records show is that if in such cases the complete operation is performed, no deaths from cancer occur.

**Tuberculous Mastitis:** A brief note comparing tuberculous mastitis with chronic lactation mastitis may not be out of place here. In the early years, after 1890, women with tuberculosis of the breast came under observation with one or more sinuses, and the breast was completely removed, often with the glands. Now and then, when there was a single sinus surrounded by an area of induration with a retracted nipple, the complete operation for cancer was performed. In a few cases, in spite of the microscopic evidence of tuberculosis, a diagnosis of cancer of the breast was made, but when these patients died, they died of tuberculosis and not of cancer. One patient, about whom there was the greatest difference of opinion, returned to the clinic ten years later with tuberculous peritonitis. We now know that a suppurating sinus practically excludes cancer of the breast, unless it is due to operation or treatment (I have just seen a suppurating sinus in cancer of the breast which followed an abscess after the insertion of radium needles).

Patients formerly came under observation with an abscess, which, as a rule, was recognized clinically, incised, and drained. As they became more enlightened and reported with less delay, we began to see tuberculosis of the breast in the stage of mastitis without suppuration or caseation. My first case, some twelve years ago, made a lasting impression. The woman was pregnant. There was an area of mastitis in the left breast that felt like cancer. I explored this area. Its gross appearance and its gritty “feel” convinced me that it was malignant. The complete operation for cancer was performed without a frozen section. To my surprise and chagrin the sections showed tubercles and tuberculous mastitis. The baby was born. The other breast became indurated. Nothing was done. The mastitis disappeared. An x-ray of the lung showed active tuberculosis. The patient recovered, however, and has nursed subsequent children on the remaining right breast. Since then I have explored similar areas in the breast in which
roentgenograms of the chest showed no evidence of tuberculosis, but tuberculosis has been recognized in the frozen section, and the breast has been saved.

The coincidence of tuberculosis and cancer is extremely rare. I have seen only one such case—tuberculosis in the glands of the axilla side by side with metastasis associated with cancer of the breast. Other cases have been reported in the literature. In 1924, I observed a breast tumor which felt like an area of mastitis, with slight dimpling of the skin. I could not tell whether the left nipple was fixed or not. The lump had been present six months and was getting larger. The patient's youngest child was eleven. As the roentgenogram showed active pulmonary tuberculosis, operation was postponed and x-ray treatment given. The lump disappeared. A year later it returned, and quickly assumed the clinical picture of cancer. The complete operation was performed. This is the only example of a cancer of the breast which I have seen in which the patient had active tuberculosis of the lung. In one case, after operation for cancer of the breast, there was postoperative bronchitis, then active tuberculosis with tubercle bacilli in the sputum, and a slow convalescence to recovery.

I trust this paper by Dr. Cohn and these remarks will stimulate the report of more examples of non-suppurative chronic lactation mastitis and tuberculous mastitis. In the universal interest in chronic cystic mastitis, other forms of mastitis have not received due attention. At the present time the evidence favors the assumption that lactation mastitis leaving a residual lump usually ends in cancer, while there is no such evidence in regard to chronic cystic mastitis.