DUCTAL CARCINOMA IN SITU

a resource for women and their health care providers

Ontario Breast Cancer Information Exchange Project

DUCTAL CARCINOMA IN SITU

A resource for women
with DCIS
and their health
care providers

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INTRODUCTION

The Ontario Breast Cancer Information Exchange Project (OBCIEP) is one of five information projects funded by Health Canada. Our mandate is to facilitate easy access to information about breast cancer and other related concerns for women, their families, and health care providers.

In a recent needs assessment, women with ductal carcinoma in situ (DCIS) overwhelmingly identified the need for more information about DCIS. This booklet has evolved out of this need, to help individuals understand what a diagnosis of DCIS means, and the impact of its treatment on their life.

It is also designed to be a resource for health care providers. Diagrams are included to help further explain the various aspects of DCIS.

To obtain copies of the referenced articles, call the Cancer Information Service at 1-888-939-3333.

DEFINING THE PROBLEM

The primary purpose in developing this booklet is to clarify the issues surrounding ductal carcinoma in situ (DCIS). Much confusion and controversy exist in relation to the diagnosis and treatment of DCIS. These issues are important because of the potential development of invasive cancer if left untreated. Women with this problem need to have a clear understanding of how in situ lesions are different from invasive breast cancer, and the rationale behind treatment recommendations.

Confusion surrounding ductal carcinoma in situ begins with the name. (Also called intraductal carcinoma of the breast.) It implies a malignant process with a potential for mortality and morbidity.

However, the fact remains **ductal carcinoma in situ is best described as a pre-malignant condition, and not a malignant breast cancer that may be considered life-threatening.** Yet despite DCIS being a pre-malignant condition, its potential for malignant progression has to be recognized and proper management instituted.

Prior to 1972, the incidence of carcinoma in situ was less than 2% of all breast cancers. This has changed with the increase in mammography screening. Now ductal carcinoma in situ comprises approximately 12% of all screen-detected breast abnormalities by the Ontario Breast Screening

Program at first screening and 16% at subsequent screens. With the advent of multidisciplinary breast screening programs and the refinement of mammography techniques, small clusters of microcalcifications (small abnormal calcium deposits which alert radiologists to the possible presence of DCIS) can now be seen years before a palpable lump is detected in the breast.

The Female Breast and DCIS

During pregnancy and after birth, special cells in the female breast produce milk. In response to the infant's suck, these cells secrete milk that is carried to the nipple through a series of ducts. Healthy cells lining the ducts are surrounded by a thin, outer basement membrane.

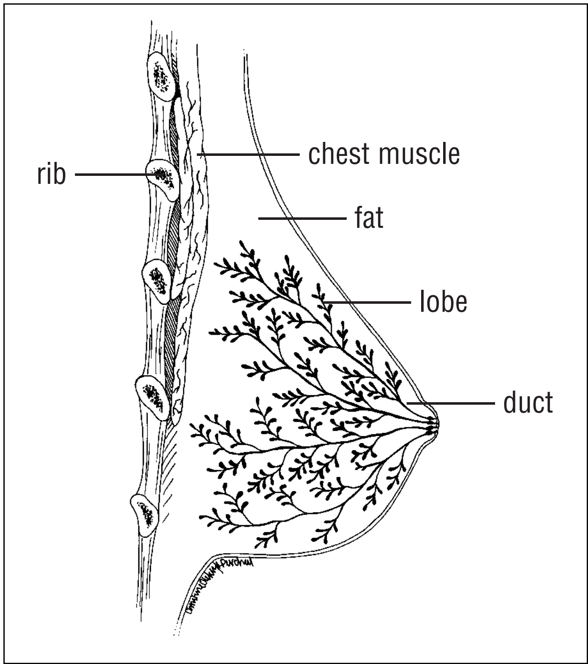


Diagram 1: Female Breast

Ductal carcinoma in situ arises from the cells that line the breast ducts and smaller ductules. The enlarged irregular cells are said to be in situ since they are contained within the duct and do not infiltrate or pass through the basement membrane. Carcinoma in situ (from Latin meaning "in its own situation") is a disease that has not started to invade into surrounding tissue.

DCIS can sometimes extend throughout several ducts of the breast at one time and be found over a large area of breast tissue. This is called multifocal DCIS.

Although the cells may not have spread through the basement membrane of the duct, or involve other sites, without adequate treatment, many ductal carcinomas in situ will develop into invasive breast cancer. The percentage of DCIS that progresses to invasion is unknown.

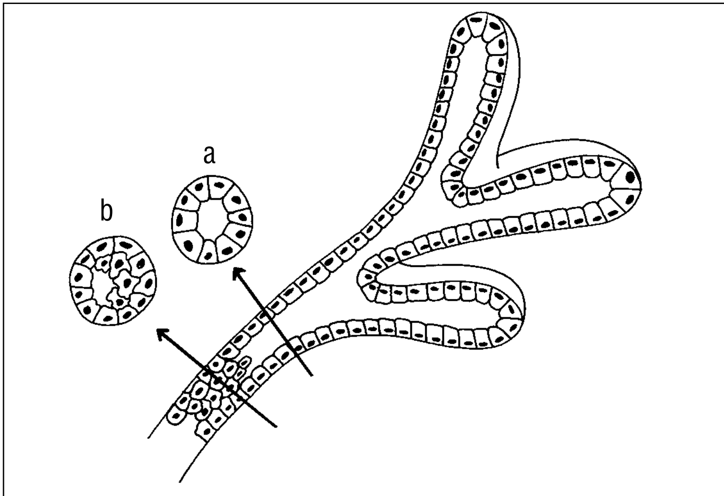


Diagram 2: Breast lobe and duct showing cross-section a) normal duct and b) DCIS

The Journey from Normal Cell to DCIS

Ninety percent of breast cancers originate in the duct cells of the breast. It is believed, that these **normal duct** cells undergo a change causing them to increase in number and size. This is known as **hyperplasia.**

As changes continue, the cells themselves begin to change and acquire an abnormal appearance. This is known as **atypical ductal hyperplasia (ADH).**

Further progression results in greater cell abnormality within the duct, now **ductal carcinoma in situ.**

Given enough time, the lesion will progress to invade and infiltrate surrounding tissues as a form of **invasive breast cancer.**

The phases of hyperplasia and atypical hyperplasia are thought to be reversible. However once the atypical cells progress to carcinoma in situ, the process may be irreversible. The time taken for cells to undergo these events may vary from one individual to another, but the process likely takes years rather than months or days.

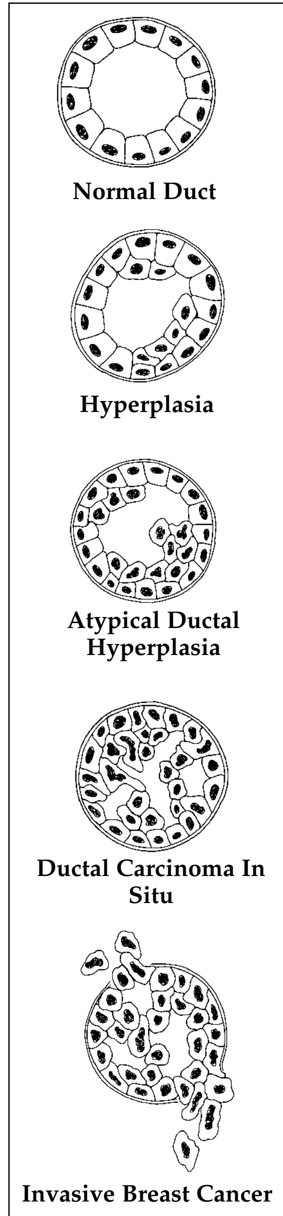


Diagram 3: Cell changes from normal to breast cancer

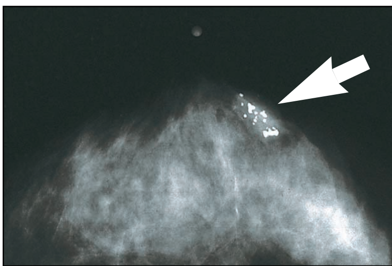
CLINICAL ISSUES

How the Diagnosis is Made

The clinical diagnosis of DCIS is most often made through mammography. Current mammographic techniques have facilitated the diagnosis of DCIS lesions when they are small and limited.

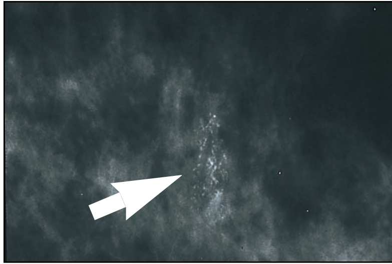
Mammograms provide a gross overview of the structures within the breast. If any abnormal areas, like calcifications, should be detected, special mammography views are recommended. These extra views use magnification and help to provide more information about the breast and the abnormal areas. Under magnification, calcifications may appear as rods or dots or branches and look like 'snake-skin' or powdery. They may be confined to a single area of the breast, or appear as clusters in various quadrants of the breast.

Mammogram showing:

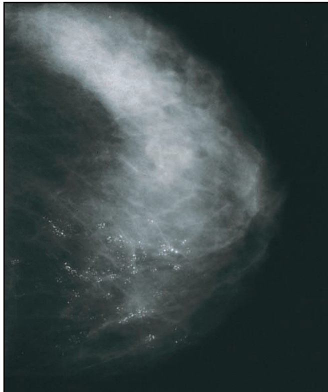


Slide 1: Benign Calcifications

Mammograms showing:



Slide 2: Focal DCIS (magnified)



Slide 3: Multifocal DCIS

A dedicated radiologist who is skilled in reading mammograms classifies the calcifications as being:

- benign
- probably benign
- indefinite
- suspicious
- frankly malignant.

For each type of calcification, a different intervention is recommended as listed in Table 1.

Table 1: Calcifications and Recommended Intervention

Type of Calcification	Recommended Intervention
Benign	• No intervention, routine follow-up
Probably Benign	• Close follow-up, repeat mammogram in six months, or tissue diagnosis
Indefinite	• Tissue diagnosis
Suspicious	• Tissue diagnosis
Frankly malignant	• Tissue diagnosis

Tissue Diagnosis

Several approaches may be used to obtain breast tissue when the mammogram is abnormal as described below.

Core Biopsy

After a local anesthetic is given, a biopsy needle is inserted into the breast and tiny tissue samples are removed from the area of concern. Multiple samples (5 - 9) are usually removed. This procedure is usually done by a radiologist in the x-ray department with computerized mammography equipment and may also be called a stereotactic core biopsy. After the specimens have been removed, they should be x-rayed to ensure that the abnormal calcifications seen on the mammogram have been sampled.

Needle Localization and Surgical Biopsy

This procedure is done prior to a surgical biopsy to help locate the abnormal area that is seen on a mammogram but cannot be felt. The radiologist inserts a very fine needle into the abnormal area seen on the mammogram.

When the area is accurately located, the needle is removed, leaving behind a fine wire to mark the spot. Although the wire is left in the breast until the biopsy, this is not uncomfortable. The wire helps to guide the surgeon during the open surgical biopsy. The tissue is x-rayed to be certain it contains the suspected area of calcifications. It is reviewed by the radiologist, who may request further tissue samples.

Surgical Biopsy
This is the surgical removal of a lump or piece of tissue from the breast. This is done when the abnormality can be felt, and does not require a needle localization.

Since DCIS is primarily diagnosed on mammogram and not palpable, core biopsy or needle localization preceding open surgical biopsy are more commonly used to obtain tissue.

Role of the Pathologist
After the tissue specimen is removed, it is sent to the pathologist. The pathologist is a physician with additional training and expertise in the microscopic examination of tissues to provide a diagnosis. The pathologist plays a role unseen to patients, but one that is critical in the diagnosis and subsequent treatment of DCIS.

When the specimen is received, the pathologist reviews the tissues carefully and systematically searches for the calcifications seen on the mammogram.

The pathological diagnosis of DCIS is one that has historically been very confusing and complex. However, over the years, pathologists have come to recognize that certain patterns of DCIS may be associated with a variety of outcomes and the possibility for disease recurrence. Because of these observations, various treatments have evolved over time with the goal of eradicating the disease before it may present as a

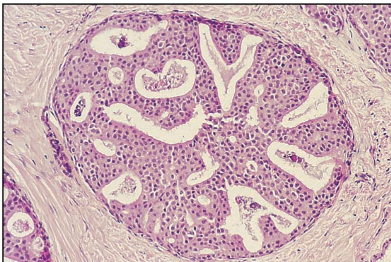
more aggressive and invasive disease. The treatment options recommended are related to the potential for the identified cells to develop into invasive cancer.

After reviewing the tissue specimen, the pathologist classifies the tumour based on the structural characteristics that are observed within the cell's nuclei. This is called grading. The problem in grading ductal carcinoma in situ is that no one grading system is universally accepted or utilized. Classifying DCIS lesions, therefore, can become complex and confusing. There are generally three grades of DCIS, each with their own common features as described in Table 2.

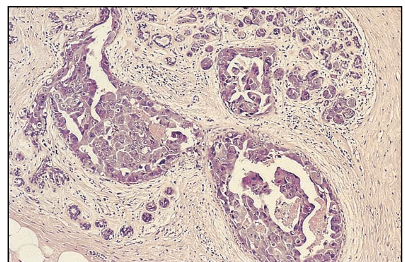
Table 2: Ductal Carcinoma In Situ Grades and Characteristics

Grade	Characteristics
Low Grade (Slide 4)	This form of the disease is considered the least aggressive. The cells are small with uniform nuclei* and no significant necrosis* is present.
Intermediate Grade	This form of DCIS has features that are in between high and low grade. The cells are intermediate in size with moderate nuclear pleomorphism*. Necrosis may be present.
High Grade (Slide 5)	This form of DCIS is considered to have the greatest potential for developing into an invasive cancer. Cells appear large with marked pleomorphism and necrosis is common. It is usually not difficult to diagnose high grade DCIS based on these pathology findings.

*** Definitions**
Nuclei: part of the cell that controls all cell functions and contains the DNA
Necrosis: dead cells found in the centre of a lesion (also termed 'comedo')
Pleomorphism: having a variety of forms



Slide 4: Low Grade DCIS



Slide 5: High grade DCIS

TREATMENT

The treatment recommended for a woman depends on the particular features of her disease. Doctors base their recommendations on current available evidence in the medical literature. The goal of treatment is to achieve the best possible outcome, cure and long-term control, while taking into consideration the woman's desire to preserve her breast.

When deciding on treatment options, the following features are considered:

- the grade of the DCIS (Are the cells low, intermediate or high grade?)
- the extent of disease (Is the disease confined to one or many areas in the breast?)
- the status of the surgical margins (Has any disease been left behind?).

Depending on the answers to these questions, the treatments proposed may include:

- lumpectomy alone
- lumpectomy with radiation
- simple (total) mastectomy.

Lumpectomy
A lumpectomy alone may be done when DCIS cells are low grade or where there is only a focus of DCIS. Lumpectomy may be selectively recommended in older individuals with other health problems that may pose greater threats than the recurrence of DCIS or invasive cancer.

Lumpectomy is best done when a tiny focus of disease can be removed widely so that the surgical margins are clear and there is no evidence of disease elsewhere in the breast.
The disease at this stage is considered local and the treatment used is for local control.

It is important to note that close clinical and radiological follow-up is essential after lumpectomy, regardless whether the disease was discovered on mammogram or on clinical examination, even when the cells are of a low grade.

Lumpectomy with Radiation
Recent studies in the past few years have shown that radiation after a lumpectomy reduces the risk of DCIS and invasive cancer recurring in the breast. For this reason, it is often recommended after a lumpectomy.

The width of surgical margins in the treatment of DCIS is highly debated. The optimal surgical margin is not yet established and completely clear margins may not always be possible for technical reasons. Radiation therapy may be added where the status of the surgical margin is unknown or if the surgical margin is not completely clear of disease.

Lumpectomy with radiation is also used when margins around the lesion are clear but the cells are of intermediate or higher grade.

A course of radiation therapy may be four to six weeks long.

Simple (Total) Mastectomy
The removal of the whole breast without the underlying muscles or lymph nodes is most often done when:

- more than one quadrant of the breast is involved with DCIS
- when two or more lesions are found
- when the lesion is large (over five centimetres in diameter).

Mastectomy may also be done when the cosmetic result may not be ideal, for example, if the individual had already had a mastectomy for breast cancer removed on one side and now has DCIS in the other breast. Sometimes a mastectomy is done when follow-up is too difficult, or when an individual does not wish to have radiation or prefers a mastectomy.

Regardless of the reasons for having a mastectomy, this may be the best lifetime or long-term option for some women.

Surgery to reconstruct the breast may be considered at the same time or at a later date.

Axillary Node Dissection
Individuals often ask about the need for the removal of underarm lymph glands (axillary node dissection).

Axillary node dissection is not usually recommended during surgery for DCIS because it is felt to be a local disease. Theoretically, there is no risk of spread outside the breast.

However, in practice, cancer cells are found in about 1% of cases. This is thought to be the result of an undetected focus of invasive cancer.

Axillary node dissection can sometimes result in chronic lymphedema and pain thus making the risks of the procedure greater than the potential benefit.

RISK OF RECURRENCE

Overall, the outcome of patients with DCIS is extremely good. The focus with this disease has been to reduce local recurrence in those for whom conservative surgical therapy is performed, and to better understand the different grades of DCIS and their influence on recurrence patterns.

Once DCIS has been discovered, it indicates that the cells have demonstrated their ability to transform and the risk of future transformation of normal to abnormal cells remains.

Constant monitoring is necessary and annual mammograms are an important complement to medical care.

Again, the risk of DCIS returning is influenced by the grade of the DCIS, the extent of the disease and margins, and the treatment given.

Many studies have shown that the risk of recurrence after a mastectomy is less than 1% (Silverstein, Fisher, Farrow 1990).

Lumpectomy alone carries an approximate recurrence of 10 - 22% (Lagios 1989, Fisher, 1995) with even lower rates noted in individuals with smaller and lower grade lesions.

Radiation after lumpectomy has been shown to reduce the risk of local recurrence of DCIS and invasive cancer. Evidence-based guidelines citing a

randomized control trial indicate a recurrence rate of 12% over eight years (Ontario Cancer Treatment Practice Guidelines Initiative, 1997). Emerging results will help us better understand the benefit of radiation therapy.

In the few individuals whose disease will recur, half will be found to have DCIS once again. In the other half, the disease will have transformed into an invasive form of breast cancer and require the usual treatments dependent on each particular case.

LIVING WITH A DIAGNOSIS

"Initially I was confused and in a state of shock, but later wanted to know what my options were."

"I wished that I had a clear understanding of the surgical options and the impact it would have on my future health."

"Was DCIS a cancer or not? I just had to keep asking questions until I felt comfortable that I understood what was going on."

(Women's comments about their experience with DCIS.)

Modern technology has enabled us to identify ductal carcinoma in situ (a premalignant condition) when it is still in its early stages. Although it is not considered life-threatening with proper treatment, the diagnosis of DCIS brings along with it the same emotional impact as having a diagnosis of breast cancer. Breast cancer has become a high profile disease, largely through the efforts of breast cancer survivors. The anxiety and psychological trauma surrounding a breast cancer diagnosis may be similar for the individual with a

diagnosis of DCIS and should not be under-estimated. For many individuals, it may be a time of added confusion because of the many uncertainties surrounding DCIS. Several women with DCIS who participated in a pilot project identified the need for information about this. This booklet has been developed in response to this need, in hopes that it will clarify some of these uncertainties and aid those involved in treatment decisions.

SUMMARY

Ductal carcinoma in situ

- is most often diagnosed from biopsied specimens of microcalcifications seen on mammography
- is usually found in one breast and frequently found in only one quadrant of one breast
- may be multi-focal or more extensive throughout the breast
- usually recurs at the site of previous disease
- has a risk of recurrence that increases with higher grade lesions
- 50% of recurrences are invasive cancer which can have an impact on survival
- is associated with the risk of invasive breast cancer, the latency period may be decades. However, this risk persists throughout the woman's life.
- treatment options are based on the grade of the cells, the extent of disease, the status of surgical margins, and patient choice.

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Cancer Information Service 1-888-939-3333
Toll-free information service of the Canadian Cancer Society

OncoLink: Ductal Carcinoma In Situ of the Breast: A Guide for Patients. University of Pennsylvania Cancer Center. http://www.oncolink.upenn.edu/disease/breast/pamphlet