



## DCIS PRECISION News about Ductal Carcinoma In Situ (DCIS)

Ductal Carcinoma In Situ (DCIS) is a breast condition that is often found on mammograms. DCIS refers to abnormal cells found inside a milk duct. Research shows that at least 3 out of 4 women (75%) with DCIS will not get a future invasive breast cancer, but almost all still receive breast cancer treatment. There are types of DCIS that are considered low-risk or higher risk. This is why DCIS is sometimes called different names. PRECISION\* is learning about DCIS risk to find women who may not need treatment. One of their published articles is explained here.

### What is the science article about?

Mice are often used in research to learn how bodies handle diseases. They are also used as a model to compare to human bodies so we can learn what might happen with new therapies before they are tested in people.

This study created conditions that are similar to human DCIS in the breasts of mice. It looked at how the DCIS grew in the mouse models over time. Researchers studied the DCIS lesions over time and looked at how different parts of cells changed. This included genes and other markers in the cells (also called genetics).

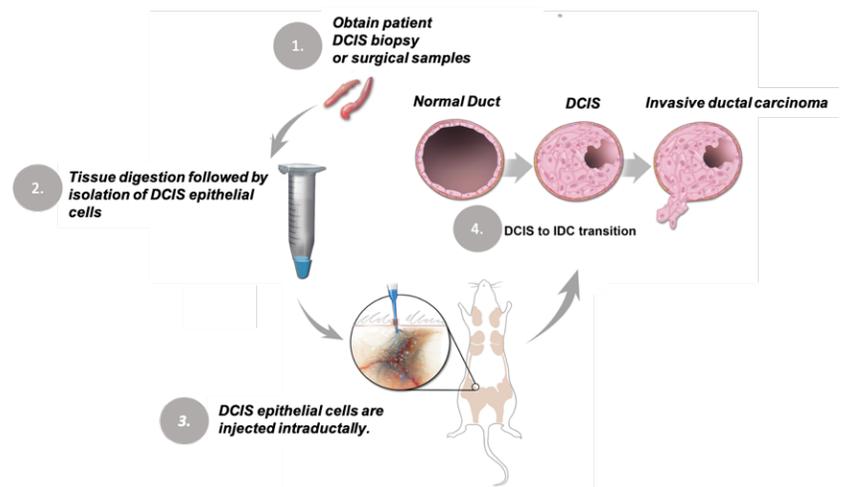
### Why was this study done?

Past studies have tried to predict whether DCIS may come back later as another DCIS or as an invasive breast cancer. Even so, there is still no clear way to predict which women with DCIS will be at risk for a future DCIS or invasive breast cancer. Research studies have not had useful mouse models for this purpose. This study developed the first mouse model which allows researchers to study the whole range of human DCIS.

The mouse model allowed scientists to find and use abnormal cells that came from a DCIS surgery. These DCIS cells were then placed into the milk ducts of mouse breasts. This model is unique because the DCIS cells were placed inside the mouse breast milk ducts so they would work in a similar way to how human DCIS develops. Some DCIS cells remained inside the milk ducts and did not become invasive over time. Some DCIS cells invaded neighbor cells after bypassing the natural barriers that surround milk ducts. In the future, scientists hope to be able to predict which patients with DCIS may be at higher risk for invasive breast cancer and which patients with DCIS may not need treatment.

### How was this study done?

1. DCIS cells were taken from 37 patients who agreed to donate their DCIS samples (called tissue) either at biopsy or surgery.
2. DCIS cells separated from the surrounding non-DCIS cells.
3. These DCIS cells were then injected into 202 mouse milk ducts in about 100 mice.
4. As in humans, DCIS formed inside the mouse breast. DCIS remained in the mouse breast almost 5 out of 10 times (47%). Other DCIS became invasive breast cancer over time over 5 out of 10 times (53%).



## What are the results of this study?

This study showed that:

- 20 out of 37 DCIS samples started to grow through the mice milk ducts to become invasive breast cancer in about 9 months.
- 17 out of 37 DCIS samples stayed inside the milk ducts and did not invade even after about 9 months.
- DCIS cells from the same patient can be different. Some cells are more aggressive than others. These cells are more likely to become invasive breast cancer.
- The mouse model allows researchers to find which cells are more aggressive and which cells are not. Similar to previous studies, researchers were not able to find any specific gene changes (mutations) in DCIS cells that were related to the development of invasive breast cancers. This may mean the environment around DCIS may play a more important role in how cells invade than do genes.

## What does it mean for women with DCIS?

This mouse model can be used to show how human DCIS may grow in mice and in humans. This is an important step that was not possible before this study.

This study had some limits that are important to point out, such as:

- The molecules and structures that surround and support breast cells (called the microenvironment) in these mice were different to those in a human breast.
- The mice have a different immune system than humans do.
- These differences may change the amount of time it takes or what steps are needed for DCIS to grow.

## What are the next steps?

This study shows that a mouse model can be used to study human DCIS and can have both invasive and non-invasive parts. It also shows that the way some DCIS changes to invasive breast cancer is specific to each person.

Future plans will:

- Copy the human breast environment and immune system in the mouse models.
- Study different parts of DCIS cells to see if new markers (called biomarkers) can help find women who may develop invasive breast cancer in the future and find those who will not.

This study was published in November 2021.

## Official name of the article is

“Mouse-INtraDuctal (MIND): An in vivo model for studying the underlying mechanisms of DCIS malignancy.”

By Hong Y, Limback D, Elsarraj HS, et al. On behalf of PRECISION.\* J Pathol. 2021. Epub 2021/10/30. doi: 10.1002/path.5820. PubMed PMID: 34714554.

The article can be found at:

<https://www.dcisprecision.org/publications/> and at <https://pubmed.ncbi.nlm.nih.gov/34714554/>.