

Sentinel Lymph Node Biopsy

What are lymph nodes?

Lymph nodes (also called lymph glands) are part of the body's immune system. Tiny channels (called lymphatics) carry fluid and debris to the lymph nodes which act as filters. The lymph nodes that filter waste fluid and cells from the breast are mainly located in the armpit (also called the axilla.) These lymph nodes are usually the first ones affected if cancer spreads beyond the breast. Other lymph nodes that can become involved with breast cancer are located near the collarbone and behind the breastbone.

Why do lymph nodes need to be removed?

Treatment for breast cancer usually involves removing some lymph nodes as well as removing the cancer from the breast. Testing the lymph nodes is very important, as it gives you and your doctor information about the breast cancer. This helps to plan further treatment.

Overall, about 70% of women with breast cancer will not have cancer in the lymph glands. The chance of cancer spreading to the lymph nodes is partly determined by the size of the cancer. Smaller breast cancers are less likely to involve the lymph nodes.

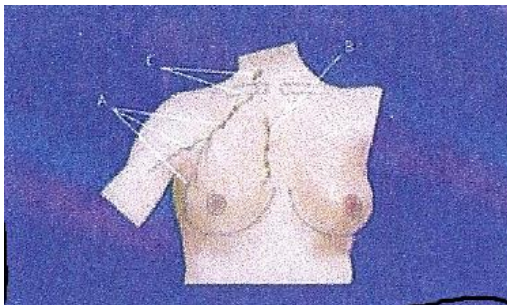


Fig. 1. Lymphatic fluid from the breast may drain to lymph nodes in three areas.

- A. armpit (axillary) lymph nodes
- B. breast bone (internal mammary) lymph nodes, and
- C. collarbone (supra and infra clavicular) lymph nodes.

How can the lymph nodes be sampled?

In the past, the usual operation for breast cancer was to remove most, if not all the lymph nodes from the armpit on the same side as the breast cancer. This operation is called axillary clearance or axillary dissection. Axillary clearance is a very effective operation to get information about whether the cancer has spread to the lymph nodes. Because all the lymph

nodes are removed, axillary clearance also helps to reduce the chance of the breast cancer coming back in the armpit in the future.

Axillary clearance has some possible side effects. These include:

- Stiffness of the shoulder
- Numbness of the inner aspect of the upper arm
- Seroma (a collection of fluid under the arm in the weeks after surgery)
- Lymphoedema (permanent swelling of the arm due to a build-up of fluid in the tissues)— See the 'Lymphoedema' Fact Sheet for more information.

Sentinel node biopsy is a technique that has evolved over recent years and it is now the usual way to assess the lymph nodes in women with early breast cancer. It aims to avoid some of the side effects of axillary clearance by removing fewer glands. Removing only the sentinel or 'guardian' nodes lessens the likelihood of complications and in most cases, still provides the necessary information about the cancer. There are still some situations when axillary clearance is needed. If cancer cells are found in the sentinel node, then axillary clearance is usually recommended.

What is a sentinel node biopsy?

The sentinel node/s are the lymph nodes that fluid from the breast 'drains' to first. Usually there are between one and three sentinel nodes. It is thought that if breast cancer cells were to escape into the lymphatic system, they would travel to the sentinel node/s before moving on to other nodes and the rest of the body. Sentinel lymph node biopsy is a technique that aims to identify and remove just the sentinel node/s and no others.

Who can have sentinel node biopsy?

Sentinel node biopsy is recommended for patients who have early breast cancer. The breast cancer itself may be removed with wide excision (conserving most of the breast) or with mastectomy (removing the whole breast). Sentinel node biopsy is also sometimes used for some women who have larger breast cancers or more than one cancer in their breast, as part of a research study. In some cases, sentinel node biopsy is done in conjunction with an axillary clearance.

How is sentinel node biopsy performed?

The sentinel node is identified, or 'mapped' using a combination of three techniques. These are:

- a nuclear medicine test called lymphoscintigraphy (lymphatic mapping) performed before the operation
- a scan using a hand-held probe performed by the surgeon during surgery
- a blue dye test, also performed by the surgeon as part of the operation.

These techniques produce a 'road map' to help the surgeon find the sentinel node for removal during the operation.

Lymphatic mapping is performed the day before, or a few hours before surgery. It is usually performed in a nuclear medicine or X-ray department. A small amount of radioactive material is injected either around the cancer or under the nipple. The radioactive tracer travels from the cancer site to the sentinel node, along the same lymphatic channels that cancer cells could travel. This can take a few minutes or a couple of hours. A series of pictures is taken to show where the sentinel node is located.

The skin over the sentinel node is marked with a pen to help the surgeon find the draining node during surgery. The injection of tracer makes the sentinel node radioactive so it can be found by the surgeon with the use of a gamma probe (a type of hand-held Geiger counter) during the operation. The dose of radiation is very small and will cause you no harm.

The blue dye test is performed at the beginning of the operation. When you are asleep, a small amount of blue dye is injected around the nipple or the cancer. The dye quickly moves into the lymphatic channels and turns the sentinel node blue, again helping the surgeon to locate the sentinel node.

This combination of blue dye and radioactive material allows a sentinel lymph node to be identified in over 98% of cases.

Once the sentinel node is found, it is removed and sent for examination by a pathologist. The pathologist, knowing this to be an important node, can perform special tests to identify even the smallest cancer deposits if they are present. It is important to understand that a lymph node that is successfully 'mapped' (i.e., one that shows up on the nuclear medicine or blue dye tests) does not necessarily contain cancer cells. Rather, it is the first lymph node likely to be affected if cancer cells have escaped into the lymphatic system and the one that is examined most thoroughly by the pathologist.

What are the advantages of sentinel node biopsy?

Most women who have breast conserving surgery and sentinel node biopsy have a shorter hospital stay, a smaller scar and a quicker recovery time than women who have all the lymph nodes removed from under their arm (axillary clearance).

Sentinel node biopsy removes fewer lymph nodes than the standard operation of axillary clearance. This lowers the risk of developing lymphoedema, pain and numbness. Although sentinel node biopsy is now the standard treatment for women with small breast cancers who do not have other evidence of involvement of their lymph glands, there are still some situations where its accuracy has not been fully tested. These situations are discussed later in this fact sheet.

What are the possible side effects of sentinel node biopsy?

- The small amounts of radioactive tracer and blue dye that are used disappear from your system in 24-28 hours. The blue dye will turn your urine blue-green for about 24 hours. The skin over your breast will also be stained blue for a couple of weeks. Mild allergic reactions can occur in 1-2% of patients. Severe allergic reactions can happen but are extremely rare.

- There may be wounds in the breast bone area as well as the armpit and on the breast.
- Lymphoedema is still possible with sentinel node biopsy. The risk of moderate or severe lymphoedema is estimated to be around 1 to 2 % compared to as risk of around 7-8% with full axillary clearance. A false negative result is possible.

What is a false-negative result?

A false negative result occurs when the lymph node removed as the sentinel (first draining) node does not contain cancer cells, while another lymph node that does contain cancer cells is left behind in the armpit. The rate of false-negative results varies between different breast cancer treatment centres. The chance of a false-negative result ranges between 1% for tumours under 2 cm and 3 to 4 % for larger tumours.

What if the sentinel node biopsy is 'positive'?

If the pathologist sees cancer cells in a sentinel node, the biopsy is said to be positive. If this happens, your surgeon is likely to recommend that you have an operation to remove all the glands under your arm (axillary clearance) in case there are other affected lymph nodes in the armpit. Sometimes if there are only a few cancer cells in the sentinel node, it may be safe not to do an axillary clearance. This remains an area of controversy and your surgeon will discuss the possible benefits and risks of each option. Research into how to best deal with this situation is currently happening around the world.

In some cases, a pathologist may be able to do tests during the operation to see if there are cancer cells in the sentinel node. If cancer cells are seen, the surgeon can do an axillary clearance as part of the same operation. In other cases, more tests are needed to find the cancer cells and the axillary clearance is performed as a separate operation if it is necessary.

Sometimes, a radiotherapy to the armpit may be offered as an alternative to axillary clearance if the sentinel node biopsy is positive.

When is sentinel node biopsy not recommended?

Some patients with breast cancer are still best treated with the traditional operation of full axillary clearance rather than with sentinel node biopsy. Some of the cases where sentinel node biopsy may not be recommended include those with:

- A large cancer in the breast
- More than one cancer in the breast
- Enlarged lymph glands felt in the armpit before surgery

In some of the cases, sentinel node biopsy is performed in addition to full axillary clearance. This is to ensure that if the cancer 'drains' to lymph nodes near the collarbone and breast bone areas, these are also sampled.

Sentinel node trials

Results from research trials evaluating sentinel node biopsy have shown that in appropriately selected patients, it is a safe method of deciding which patients should go on to have full axillary clearance.

Clinical trials are still being done to further define the role of sentinel node biopsy in the treatment of breast cancer. You may be asked whether you would like to be part of such a study.