Sentinel Node Biopsy Procedure

Patient information

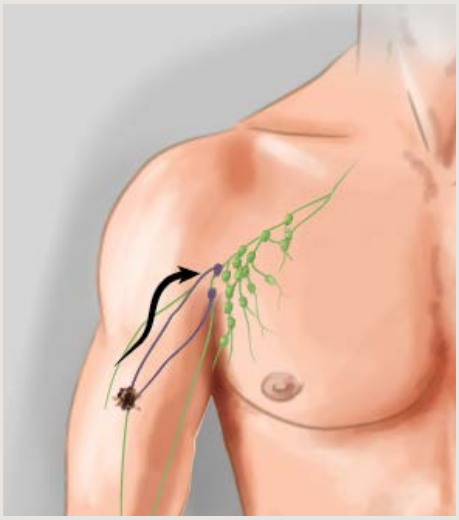
What is a sentinel node biopsy?

Sentinel node biopsy (SNB) is a procedure that provides very important information to help predict the risk of melanoma spread in the future.

What is a sentinel node?

Lymph is fluid that escapes from blood vessels into the tissues. It travels in a network of lymphatic vessels that eventually returns this fluid to the blood stream. Lymph nodes are glands or filters found along these lymphatic vessels that help the body to mount a response to infection or cancer. Lymph nodes are commonly found clustered together, particularly in the neck, armpit (axilla) and groin.

Nearly all parts of the body have lymphatic drainage to a specific lymph node or several lymph nodes. The pattern of lymph fluid drainage is different for each individual. The sentinel node/s are the first lymph nodes along the lymphatic vessels that drain lymph fluid from the part of the skin that has a melanoma on it.



Sentinel nodes are the first lymph nodes to which the cancer cells spread from the primary melanoma via the lymphatics system.

Why do I need a sentinel node biopsy?

When melanoma of significant severity is first diagnosed then most melanoma surgeons would offer SNB to accurately stage the melanoma. When SNB is not done then the presence of melanoma in the lymph nodes goes undetected until a later date when it is detected by forming a lump or identified on an ultrasound or other radiology test.

Surgically removing the sentinel lymph node or nodes (known as an SNB) enables the pathologist to examine the lymph nodes very carefully under the microscope to see if the melanoma has spread to that area.

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At present the only reliable way of telling whether sentinel nodes contain malignant cells is by surgically removing them so a pathologist can fully assess the lymph nodes with specialised techniques.

A sentinel node biopsy provides very important information that helps predict the risk of melanoma spread in the future.

What if my SNB is positive?

In the SNB procedures we perform at Melanoma Institute Australia, around 16% of patients have a positive SNB (ie, the sentinel node contains melanoma). The chance of a sentinel node being positive varies depending on the nature of the primary melanoma and age of the patient.

SNB is not recommended for patients with low-risk melanoma or if the patient isn't fit for the surgery. Most people having an SNB have no disease in the lymph nodes and don't directly benefit other than receiving reassurance. MIA has developed an online calculator that helps to predict your risk of having a positive sentinel node biopsy. Your clinician can access this calculator at **melanomarisk.org.au** and discuss your results with you to help inform your decision making.

There are, however, long-term benefits from removing sentinel nodes when they contain minimal disease. Nearly all patients with lymph node disease who don't have an SNB develop a lump at the site where the sentinel node would have been. If this occurs, most patients today receive immunotherapy before surgery to evaluate how their cancer responds to the treatment. This is often followed by a full therapeutic lymph node dissection (TLND), which is a significant and complex operation that can have serious side effects for many patients.

Most patients with a positive SNB are considered for drug therapy to reduce the risk of recurrence (adjuvant immunotherapy or BRAF targeted therapy). Patients with a positive SNB don't generally receive completion lymph node dissection (CLND) anymore.

It is important to remember that sentinel node biopsy is a diagnostic test. As with many other medical tests there is an error rate. This means one or two in 10 positive cases are missed by the test and the melanoma could still develop in the adjacent lymph nodes in the future. This means that even if the test is negative there is a small chance of developing lymph node involvement in that same area at a later date. We are working very hard on technical improvements to minimise the error rate.

The procedure

There are three steps to the SNB procedure.

1. A pre-operative lymphoscintigram.
2. Intraoperative lymphatic mapping with blue dye.
3. Selective biopsy of sentinel nodes.

1. Lymphoscintigram

A lymphoscintigram, also referred to as a 'lymphatic drainage scan' or a 'lymphatic mapping test', is a nuclear medicine scan.

This procedure is often done the day before the operation or on the morning before an afternoon operation. There is no need to fast (no food or drink) specifically for this test but you must be fasted for 6 hours before the due time for the operation.

The first step in performing a lymphoscintigram is a small injection of radioactive 'tracer' around the site of the melanoma. This injection stings for a few seconds. The procedure then involves lying quietly under a scanning machine for several periods of time over 2–2.5 hours.

Scans are done with several different cameras to pinpoint the exact location of the sentinel nodes. This may include a SPECT/CT camera that shows the tracer in the sentinel node while the CT scan shows the anatomy of the area. These two technologies can be fused into the one image for more accuracy.

Isotope-detecting gamma cameras and SPECT/CT scanners are used by Nuclear Medicine Physicians to locate the sentinel node.

Although the tracer is radioactive, there is no significant risk to you from its use. This is because the radiation dose is very small and it loses radioactivity very quickly. In addition, nearly all the entire residual radioactivity is removed when the melanoma is widely excised (within 24 hours).

In the Nuclear Medicine Department, lymphoscintigraphy is used to find the location of the first lymph nodes on the lymph drainage pathway. These nodes from the primary melanoma site are identified as the sentinel nodes. The site/s will be marked on the skin with indelible ink as a cross.

Often a small (permanent) tattoo dot is also used to mark each sentinel node site for future reference during check-ups. If crosses have been marked on your skin, please do NOT wash them off. If you feel strongly that you do not want the tattoo marks, tell the nuclear medicine technician.

The location of sentinel nodes will be marked on the skin with washable ink (X) and/or a small tattoo dot.

Once the sentinel nodes have been marked, you may also have an ultrasound examination of the sentinel nodes. If ultrasound shows a tiny 'lump' on a sentinel node this will be biopsied with a fine needle. A positive biopsy for melanoma will influence the surgery you have.

Most patients, however, will have a normal ultrasound examination and will then proceed to the operation where the sentinel node is removed so that the lymph node can be carefully examined under a microscope. If the ultrasound is normal, it does not exclude the presence of microscopic deposits of melanoma in the sentinel node.

Why is this test necessary?

The lymphatic drainage from a given site on the skin varies quite markedly from one person to the next. This test is a reliable way of demonstrating exactly where your sentinel nodes are located. The SPECT/CT pictures may also help the surgeon to plan the surgical removal of the sentinel nodes and speed up the procedure.

Side effects

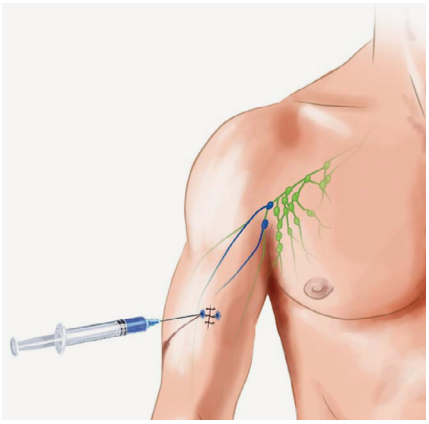
There will be slight pain at the injection site during and shortly after the tracer injection – the injections may sting about as much as the local anaesthetic you most likely had when the melanoma was removed. You may also experience some redness at the injection site for an hour or so.

2. Intra-operative lymphatic mapping with blue dye

The second stage in the sentinel node biopsy procedure is an injection with a special blue dye at the time of the surgery. When you are under anaesthetic an injection of Patent Blue V dye is placed around the melanoma site. This blue dye travels in the lymphatic vessels to the sentinel nodes in the same way as the radioactive isotope during lymphoscintigraphy. The blue dye is used to make it easier for the surgeon to find the lymph nodes identified by the lymphoscintigram by staining them blue. It provides the surgeon with extra certainty that each correct sentinel node has been identified.

Side effects

The procedure may be accompanied by discolouration of the injected skin and discolouration of the lymphatic channels leaving the injection site. This discoloured tissue is normally removed completely as part of the wide local excision procedure, but it can leave some staining of the surrounding skin. Usually any discolouration washes off but it may take a few weeks to disappear in some cases. There may be blue/green discolouration of the urine lasting no more than 48 hours. There is a possibility of having an allergic reaction, which can be serious, but this is very rare and will be treated immediately.



Injection of a blue dye helps the surgeon identify the sentinel lymph nodes.

3. Selective biopsy of lymph nodes identified as sentinel nodes

After the intra-operative lymphatic mapping procedure is performed, the selective surgical removal of the sentinel lymph nodes will be done while you are still under anaesthetic. The procedure is normally performed at the same time as the wider excision of the original melanoma site. Selective biopsy of sentinel lymph nodes involves an incision over the area of the marked lymph nodes that have been identified by the lymphoscintigram.

Any lymph nodes with significant radioactivity from the lymphoscintigraphy or blue dye in them are identified as sentinel nodes. They will be surgically removed and sent to the pathologist for very careful examination.

In the past, if melanoma cells were found to be present, a second operation was usually recommended to remove the remaining lymph nodes in that area, known as a completion lymph node dissection. This procedure is now rarely recommended. Instead, patients are usually referred to a medical oncologist to discuss risk-lowering (adjuvant) immunotherapy.

Side effects

The side effects that may accompany a sentinel lymph node operation include:

- pain and/or discomfort at the incision site
- loss of sensation in and around the incision site, as well as in the adjacent area
- swelling due to fluid collection at the incision site, which may be accompanied by a local infection and/or delayed wound healing
- swelling of the limb or the area nearest to the incision site.

In a small percentage of cases, permanent limb swelling (lymphoedema) may occur after a sentinel node biopsy. This almost always follows a groin sentinel node biopsy and is usually mild.

Completion lymph node dissection

Completion regional lymph node dissection is the thorough removal of all the remaining lymph nodes in the area where the SNB was done – usually the neck, armpit or groin. This operation is rarely required these days but if it is recommended for specific reasons by your doctors or requested by the patient, it is usually performed 2–4 weeks after the SNB. You will not wake up from an SNB and find that you have had a completion regional lymph node dissection.

For melanoma patients with lymph node positive disease, finding it by SNB before it is apparent to the doctors on examination or on radiology tests is still the best way of minimising the chance of needing a lymph node dissection with its possible major morbidity.

Side effects

Side effects that may occur after a CLND include:

- problems with wound healing
- wound infection
- swelling in the area of the wound (indicating a collection of lymph fluid) that may require needle aspiration after the surgical drains are removed
- permanent or fluctuating swelling in the limb nearest the CLND (known as lymphoedema); specialised treatment with compression garments and massage techniques may be required
- loss of sensation in and around the site of the surgery; some loss of sensation may be permanent, but it may take several years to determine if this is the case
- distortion of the natural anatomy of the operative site; this is a consequence of performing adequate surgery to remove any potential residual melanoma. Deformity sometimes cannot be avoided, but your surgeon will make every attempt to minimise deformity and disability without compromising the effectiveness of the surgery
- increased susceptibility to infection of the involved limb if injury occurs, which will require more attention to skin cuts or abrasions of the limb in the future.

Further reading

You may like to read some other patient information brochures which may be relevant at **melanoma.org.au:**

- Axillary Lymph Node Dissection
- Exercises Following Axillary Dissection
- Neck Lymph Node Dissection
- Exercises Following Neck Dissection
- Groin Lymph Node Dissection
- Exercises Following Groin Dissection
- Lymphoedema

Please note: The information in this brochure is of a general nature and should not replace the advice of healthcare professionals. All care has been taken to ensure the information presented here is accurate at the time of publishing (February 2025).

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