

Sentinel Lymph Node Biopsy

Key Points

- A sentinel lymph node (SLN) is the first lymph node(s) to which cancer cells are likely to spread from the primary tumor. Cancer cells may appear in the sentinel node before spreading to other lymph nodes (see Question 2).
- SLN biopsy can be used to help determine the extent or stage of cancer (see Question 3).
- Because SLN biopsy involves the removal of fewer lymph nodes than standard lymph node removal procedures, the potential for side effects is lower (see Questions 5 and 6).

1. What is a lymph node?

A lymph node is part of the body's lymphatic system. In the lymphatic system, a network of lymph vessels carries clear fluid called lymph. Lymph vessels lead to lymph nodes, which are small, round organs that trap cancer cells, bacteria, or other harmful substances that may be in the lymph. Groups of lymph nodes are found in the neck, underarms, chest, abdomen, and groin.

2. What is a sentinel lymph node (SLN)?

The sentinel lymph node is the first lymph node to which cancer is likely to spread from the primary tumor. Cancer cells may appear in the sentinel node before spreading to other lymph nodes. In some cases, there can be more than one sentinel lymph node.

3. What is SLN biopsy?

SLN biopsy is a procedure in which the sentinel lymph node is removed and examined under a microscope to determine whether cancer cells are present. SLN biopsy is based on the idea that cancer cells spread (metastasize) in an orderly way from the primary tumor to the sentinel lymph node(s), then to other nearby lymph nodes (1, 2).

A negative SLN biopsy result suggests that cancer has not spread to the lymph nodes. A positive result indicates that cancer is present in the SLN and may be present in other lymph nodes in the same area (regional lymph nodes). This information may help the doctor determine the stage of cancer (extent of the disease within the body) and develop an appropriate treatment plan (2).

4. What happens during the SLN biopsy procedure?

In SLN biopsy, one or a few lymph nodes (the sentinel node or nodes) are removed. To identify the sentinel lymph node(s), the surgeon injects a radioactive substance, blue dye, or both near the tumor. The surgeon then uses a scanner to find the sentinel lymph nodes(s) containing the radioactive substance or looks for the lymph node(s) stained with dye. Once the SLN is located, the surgeon makes a small incision (about ½ inch) in the skin overlying the SLN and removes the lymph node(s).

The sentinel node(s) is/are checked for the presence of cancer cells by a pathologist (a doctor who identifies diseases by studying cells and tissue under a microscope). If cancer is found, the surgeon



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will usually remove more lymph nodes during the biopsy procedure or during a follow-up surgical procedure. SLN biopsy may be done on an outpatient basis or require a short stay in the hospital.

5. What are the possible benefits of SLN biopsy?

To understand the possible benefits of SLN biopsy, it helps to know about standard lymph node removal. Standard lymph node removal involves surgery to remove most of the lymph nodes in the area of the tumor (regional lymph nodes). For example, breast cancer surgery may include removing most of the axillary lymph nodes, the group of lymph nodes under the arm. This is called axillary lymph node dissection (ALND).

If SLN biopsy is done and the sentinel node does not contain cancer cells, the rest of the regional lymph nodes may not need to be removed. Because fewer lymph nodes are removed, there may be fewer side effects. When multiple regional lymph nodes are removed, the patient may experience side effects such as lymphedema (swelling caused by excess fluid build-up), numbness, a persistent burning sensation, infection, and difficulty moving the affected body area (1, 3).

6. What are the side effects and disadvantages of SLN biopsy?

Side effects of SLN biopsy can include pain or bruising at the biopsy site and the rare possibility of an allergic reaction to the blue dye used to find the sentinel node. Patients may find that their urine is discolored or that their skin has been stained the same color as the dye. These problems are temporary (2).

Although some surgeons consider SLN biopsy to be the standard of care for some cancers, its role and benefit are yet to be determined (2). We do not know whether SLN biopsy improves a patient's survival or reduces the chance that the cancer will recur (come back). That is why studies are being conducted to compare SLN biopsy with standard lymph node dissection (see Question 8).

7. What research has been done with SLN biopsy?

The concept of mapping (finding) the SLN was first reported in 1977 by a researcher studying cancer of the penis (2, 3, 4). In the 1980s, researchers at the University of California, Los Angeles (UCLA) developed the technique of lymphatic mapping to identify the SLN in patients with melanoma (3). SLN mapping for breast cancer was first reported in 1994 (1, 3). Since then, researchers have improved methods for finding the SLN. Several studies have shown that when the sentinel node is negative, the remaining nodes are usually negative (1, 3). However, these studies were done in a small number of centers and overall survival was not examined.

Other research has focused on the identification of the SLN in patients with cancer of the vulva, cervix, prostate, bladder, thyroid, head and neck, colon, rectum, stomach, as well as non-small-cell lung cancer and Merkel cell cancer (2, 3, 4, 5). Clinical studies continue to examine the accuracy of SLN biopsy and its effect on survival of people with various cancers.

8. What clinical trials (research studies) are being conducted with SLN biopsy?

The National Cancer Institute (NCI) recently sponsored two large randomized clinical trials (research studies) for breast cancer comparing SLN biopsy with conventional axillary lymph node dissection. The trials were conducted by the National Surgical Adjuvant Breast and Bowel Project (NSABP) and the American College of Surgeons Oncology Group (ACOSOG). NSABP and ACOSOG are both NCI-sponsored Clinical Trials Cooperative Groups, which are networks of institutions and physicians across the country who jointly conduct trials. Although several studies have examined the correlation between the sentinel node and the remaining axillary nodes, these are the first two randomized trials that will compare the long-term results of SLN removal with full axillary node dissection. Both of these large trials are now closed.

9. Where can people find more information about clinical trials with SLN biopsy?

The NCI's Web site provides general information about clinical trials at <http://www.cancer.gov/clinicaltrials/> on the Internet. It also links to PDQ®, the NCI's cancer information database. PDQ contains detailed information about specific ongoing clinical trials in the United States, Europe, and elsewhere.

Information about clinical trials with SLN biopsy is also available from the NCI's Cancer Information Service (CIS). The CIS, a national information and education network, is a free public service of the NCI, the Nation's primary agency for cancer research. The toll-free phone number for the CIS is 1-800-4-CANCER (1-800-422-6237). The CIS also offers online assistance through the Help link at <http://www.cancer.gov/> on the Internet.

Selected References

1. Harris JR, Lippman ME, Morrow M, Osborne CK, editors. *Diseases of the Breast*. 3rd ed. Philadelphia: Lippincott Williams & Wilkins, 2004.
2. DeVita VT Jr., Hellman S, Rosenberg SA, editors. *Cancer: Principles and Practice of Oncology*. Vol. 1 and 2. 6th ed. Philadelphia: Lippincott Williams and Wilkins, 2001.
3. Cochran AJ, Roberts AA, Saida T. The place of lymphatic mapping and sentinel node biopsy in oncology. *International Journal of Clinical Oncology* 2003; 8:139-150.
4. Gipponi M, Solari N, Di Somma FC, Bertoglio S, Cafiero F. New fields of application of the sentinel lymph node biopsy in the pathologic staging of solid neoplasms: Review of literature and surgical perspectives. *Journal of Surgical Oncology* 2004; 85:171-179.
5. Ota DM. What's new in general surgery: Surgical oncology. *Journal of the American College of Surgeons* 2003; 196(6):926-932.

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Related NCI materials and Web pages:

- National Cancer Institute Fact Sheet 1.4, *NCI's Clinical Trials Cooperative Group Program* (<http://www.cancer.gov/cancertopics/factsheet/NCI/clinical-trials-cooperative-group>)
- National Cancer Institute Fact Sheet 5.32, *Cancer Staging* (<http://www.cancer.gov/cancertopics/factsheet/Detection/staging>)
- National Cancer Institute Fact Sheet 7.47, *How To Find a Doctor or Treatment Facility If You Have Cancer* (<http://www.cancer.gov/cancertopics/factsheet/Therapy/doctor-facility>)

How can we help?

We offer comprehensive research-based information for patients and their families, health professionals, cancer researchers, advocates, and the public.

- **Call** NCI's Cancer Information Service at 1-800-4-CANCER (1-800-422-6237)
- **Visit** us at <http://www.cancer.gov/> or <http://www.cancer.gov/espanol>
- **Chat** using LiveHelp, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>
- **E-mail** us at cancergovstaff@mail.nih.gov
- **Order** publications at <http://www.cancer.gov/publications> or by calling 1-800-4-CANCER
- **Get help** with quitting smoking at 1-877-44U-QUIT (1-877-448-7848)

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