One of the common places breast cancer spreads is to the lymph nodes under the arm, called the axillary nodes. In the past these nodes were always removed in patients with infiltrating breast cancer in an operation called axillary lymph node dissection. There were several problems with that approach. Many patients (in the range of 25-30% or so) developed a permanent swelling of the arm called lymphedema. In addition, there was a great deal of numbness and discomfort in the axilla (underarm) and upper part of the arm. It was also not a very reliable way of determining whether tumor was present in the nodes. Pathologists all around the country would routinely take one or two samples from the middle of the lymph node and, if no cancer was present there, they would report it as “node negative.” We know from many studies that tumor was present elsewhere in the node in 20 – 30% of patients and was not detected by that method. It was not practical, though, for the pathologist to do a detailed examination of all 15 or 20 lymph nodes. Those problems have been largely resolved by a technique known as sentinel node biopsy. When we give the pathologists a small number of nodes (sentinel nodes) to examine, they can make multiple serial sections through the nodes looking for small amounts of tumor. It is a much more accurate way of finding tumor in the node than the old way of making one or two sections through the center of the node. If the node is negative on serial sections, it is usually truly negative.

The management of lymph nodes has changed substantially in the last two decades. In the mid 1990’s sentinel node biopsy gradually began replacing axillary node dissection to determine whether the axillary nodes were involved with cancer. Many published studies have documented the accuracy of the procedure, and it is now clearly standard care for patients whose nodal status is not known at the time of the operation. The sentinel nodes are simply the first nodes under the arm into which the breast drains. All of the tiny lymphatic vessels in the breast converge near the underarm into a few channels and drain into a few lymph nodes first. These nodes can be identified with a high degree of reliability by injecting a small amount of a radioactive tracer, technetium, into the breast just before the operation. The injection is done by a radiologist in the nuclear medicine department of the hospital. The radiologist will first inject Xylocaine to reduce the burning sensation that can accompany the injection. The small dose of radiation is about the same as one gets with a routine chest x-ray. In the operating room we listen under the arm with a gamma (Geiger) counter and can hear the radioactivity in the lymph nodes. Regardless of how loud the sound is, or how high the number is on the gamma counter screen, that has nothing to do with whether there is cancer in the node. The count will be the same.
whether cancer is present or not. It just lets us know which nodes to remove to send to the pathology lab to determine if cancer is present. After the induction of general anesthesia we sometimes inject a small amount of blue dye, usually in the area beneath the nipple areolar complex. An inflammatory reaction around the site of injection can sometimes cause a tender mass for a period of weeks or months after the injection. When we make an incision under the arm, we can see the blue dye coursing through the small lymphatic vessels and staining the nodes bright blue. We remove any radioactive, blue, or palpable (ones we can feel) nodes. Sometimes it is only one node; sometimes 4 or 5. The average number of nodes we remove is between 2 and 3 per patient. If the sentinel nodes do not contain cancer, the chance that other nodes have cancer in them is quite small, and they are left undisturbed. This markedly reduces the unpleasant side effects of lymph node dissection, including the risk of lymphedema which is a swelling of the arm that can be permanent.

There is a known “false negative” rate of about 5 – 10% in the literature for sentinel node biopsy. In other words, there is one chance in ten to twenty that tumor could be in a node other than the sentinel node and could conceivably cause a recurrence in the axilla. Nevertheless, the chance of a recurrence of cancer in the axilla seems to be far less than we would predict from the published false negative rate of 5 or 10%. A large study from Memorial Sloan-Kettering Cancer Center in New York reported that the axillary recurrence rate was 0.25% (two and a half patients in a thousand) in over 4000 patients who had sentinel node biopsy.

When the sentinel nodes are negative, nothing needs to be done to the remainder of the nodes, and we now have very good data to support that management. If tumor is present in one of the sentinel nodes, there is a chance that cancer could be in another node. Accordingly, up until a few years ago, the usual recommendation around the country was to remove the remainder of the lymph nodes. A large study where patients were randomized to either have the remainder of the nodes removed or left behind was reported in 2010, and the chance of recurrence under the arm after a partial mastectomy and radiation was quite low, even if one or two sentinel nodes were positive and the patient did not have the remaining nodes removed. There also did not seem to be any difference in survival regardless of whether the remaining nodes were removed. So, if only one or two sentinel nodes have cancer and all abnormal appearing nodes are removed, it is probably reasonable to do nothing more to the remaining nodes. This management assumes that the patient is going to get breast radiation. That study did not include patients who were having mastectomy as opposed to lumpectomy and radiation, but we have older studies that suggest that positive lymph nodes can be left behind with little, if any, impact on survival. The chance of a recurrence in the axilla would be higher after a mastectomy if positive nodes were left behind, increasing the chance that another operation would be necessary in the future.
We can estimate the risk of having further node involvement by using a computer program. If that risk is substantial, many patients want to have the remaining nodes treated in some manner despite the fact that there is little evidence of any significant survival benefit, since it decreases the possibility of having to deal with it again. The standard way of treating the remaining nodes is to remove them with an axillary dissection. In some studies the chance of having at least some permanent swelling of the arm is around 25 – 30% after axillary dissection. In patients who are having breast preservation and are going to be receiving radiation to the breast anyway, a reasonable alternative to removing the remainder of the nodes is to have the radiation oncologist extend the treatment ports and include the remainder of the nodes in the radiation field. This avoids the sunken appearance of the underarm and much of the numbness that accompanies an axillary dissection. In addition, it is not necessary to leave drains in place for a couple of weeks as is done with an axillary dissection. The chance of recurrence in the axilla following radiation is the same as it is with an axillary dissection (very low), and the risk of lymphedema (swelling of the arm) is cut in half.

Patients who are having mastectomy frequently do not have radiation, so the management of those patients who have involved nodes is still evolving. Sometimes we are able to make a decision before the operation, and other times we make that decision in the operating room depending on the findings. If we know ahead of time that we would treat a node positive patient with radiation, we likely would not do a frozen section in the operating room to get an immediate answer. If we are considering removing the remaining nodes if they are positive for tumor, we would perform frozen section on the sentinel nodes so we can remove the nodes at the time of mastectomy. One factor that enters into the decision making equation is whether the patient is going to have reconstruction, since radiation therapy complicates the reconstruction. There is a chance the frozen section will not show cancer, but cancer could be found later on serial section of the nodes. Depending upon the risk of residual cancer, returning to the operating room for removal of the remainder of the nodes, treatment of the remaining nodes with radiation, or using systemic treatment (chemotherapy or hormonal therapy) would all be potential options. There is evidence from a study that was done in the 1970’s that there is little, if any, reduction in the chance of cure if the remaining nodes are left behind, but a significant chance of having to operate again in the future to remove the remaining nodes because of a recurrence of the cancer. A more modern study from Memorial Sloan Kettering Cancer Center shows that with limited cancer in the lymph nodes at the time of mastectomy, the chance of a recurrence under the arm is really quite small.

The above discussion has been about patients who do not have known cancer in the lymph nodes at the time of their operation. The management of the axilla in patients who have biopsy proven cancer in them prior to the operation is more controversial and is still evolving. The standard treatment has been to remove the nodes with an axillary dissection, frequently after the patient has been treated with pre-operative chemotherapy. Another alternative, although there are not yet enough data to make it the standard, is to remove the sentinel nodes and any palpable disease after pre-operative chemotherapy.
and treat the remaining nodes with radiation. Clinical trials are being done in patients who have positive nodes before they receive pre-operative chemotherapy in whom the nodes have become negative at the time of sentinel node biopsy. It is not yet known whether it is safe to omit axillary dissection or radiation in those patients.

In general (although there are some exceptions), we do not perform sentinel node biopsy in patients who are having a partial mastectomy for a pre-operative diagnosis of DCIS, since the chance of finding cancer in the lymph nodes is small. If the removed specimen shows that there is invasive cancer present in addition to the DCIS, we can always go back to the operating room and perform a sentinel node biopsy at a later date. When there is a high chance that we will find invasive cancer at the time of partial mastectomy for DCIS, for example patients with a palpable mass, or patients with extensive high grade DCIS, we might perform a sentinel node biopsy at the time of partial mastectomy. In patients who are having mastectomy, though, we “burn a bridge” when we remove the breast. We cannot go back and easily do a sentinel node biopsy because the breast is no longer present for injection of the technetium and blue dye. For that reason we do a sentinel node biopsy at the time of mastectomy, even if the diagnosis is only DCIS, in the event the final report shows that there is invasive cancer present.

When blue dye is injected into the breast it occasionally is close enough to the skin to cause a blue staining. In that event, the blue “tattoo” can persist for a year or more before it gradually fades away. Sometimes there is an inflammatory response in the breast around the injection site and a tender mass is present for a few weeks or months. Most of the blue dye is excreted in the urine and bowel movements over a few days, staining them blue. That is not anything of concern and will clear up in a day or so.