CHARLEEN KIM: Hi. My name is Dr. Charlene Kim. And I'm a general surgeon with West Coast Surgical Associates. My topic today for you is breast cancer.

Breast cancer is an actually very expansive topic. And when I go to conferences, this topic itself can last five days of conference time. But I'm going to condense it down for you in about 40 minutes.

Breast cancer is important because it is the most common cancer in women. It is the second leading cause of cancer death behind lung cancer, and 1 in 8 women in their lifetime will have breast cancer. This is irrespective of genetics and family history. However, if the patient does have a family history of breast cancer, their risk is doubled. The most important thing when it comes to breast cancer in terms of survival is early detection.

So how do we detect breast masses? Breast masses are detected by palpation. Often times, the patients will come to our office and they'll have a breast mass that they felt themselves. They'll come concerned and they'll ask the physician, often the primary care doctor, whether or not this cancer-- or sorry-- whether or not this mass is worrisome for cancer. And other ways would be that the patient is coming to you for a physical examination, their yearly exam, and you palpate a mass in the breast that might be concerning for a malignancy.

The patient will also go through screening mammograms starting at age 40. And a malignancy can be detected at that time, as well. Ultrasound is another modality to detect a breast mass.

So to go over the different imaging modalities, I'm going to talk about screening mammogram, which is where the patient will come to a mammogram suite. And they will have their breasts placed into a mammogram machine. And the breasts will be squished, top to bottom and that's called a craniocaudal view, to look at the breast in a two-dimensional plane.

Another dimension that the radiologist will look at is the MLL view or the Medial Lateral Oblique view, where the breast is squished from side to side. These give images that are two-dimensional to the radiologist to look at to evaluate the breast for any suspicious lesions. If there is a suspicious lesion, the patient will go on to a diagnostic mammogram, which will show the breast in a more compressed view or magnified view. And that will help the radiologist determine whether or not this mass is malignant or suspicious for malignancy and require a biopsy.

Another newer modality is tomosynthesis. And this is an image of the tomosynthesis machine. This machine will image the breast in a three-dimensional picture in that it takes slices through the breast, almost like a CT scan, so that the entire breast can be evaluated in slices. And that will help to evaluate the breast to see if there are any masses that might otherwise be hidden by densities.

Ultrasound, as shown here, is another imaging modality that can evaluate breast masses to see if they are suspicious for malignancy. And lastly, MRI. MRI is not usually used as a screening modality for most patients because it is very sensitive. However, in a select group of patients, MRI may be useful to identify a breast mass.

I'd like to talk about breast density because density actually is very important in discussing mammographic findings in patients. And in the state of California, breast density is now a requirement to be reported in mammograms. The radiologist will dictate the density as either being fatty breast, scattered densities, heterogeneous densities, or extremely dense breasts.

And I'll show you these images that show, in Figure A, an example of a breast that is a fatty breast. You can see the breast parenchyma is very fatty. And you don't hardly see any of these densities, which are these white areas in the breast tissue. Moving, on to Figure B, this is considered a scattered density image, where you see these white areas within the breast tissue. Figure C shows heterogeneously dense breasts, and D is extremely dense.

Why does this matter? This matters because we know that 50% of patients who have mammograms will have dense breasts that fit in the category of either heterogeneously dense or extremely dense breast tissue. This actually increases their relative risk for breast cancer by two.

So if we think about this, the question becomes, what do we need to do extra as far as screening is concerned? Well, the reality is that if the patient just has a dense breast and they have no other risk factors for malignancy or breast cancer, no further screening is required. However, if the patient has dense breasts with a clinical suspicion for malignancy, you might consider tomosynthesis, which is, again, that 3D image of the breast, or whole breast ultrasound.

Now lastly, if the patient has dense breasts and also has a lifetime risk of breast cancer that is 20% to 25%, an MRI should be considered for screening. Lifetime risk can be assessed by certain risk models, for example, the Gail model or Tyrer-Cuzick model.

Now, once a patient has a breast mass, the radiologist will read a mammogram as a BIRADS 4, which means that the breast mass is considered suspicious, requiring a biopsy. If the patient also comes with a clinically suspicious mass, then these patients also would require a biopsy. And there's different ways of biopsy in the breast, which I'll go over in a second here.

This is a quote from the American Society of Breast Surgeons that states that we no longer will biopsy patients in the operating room with an operation. In the past, we used to take patients with a breast mass or a suspicious lesion to the operating room, open their breast, make an incision, take a lump of the tissue out and make an incisional biopsy, close them up for diagnosis. This is no longer the standard of care. Nowadays, what we're doing is we are actually doing percutaneous needle biopsies of the breast to make a diagnosis. And once the diagnosis is made, then we determine whether or not the patient needs surgery.

So the most common modality for biopsy in breasts is by ultrasound guidance. Ultrasound guided core biopsies are very nice and very convenient for patients because it can be done in the office. It can also be done in the radiology suite. What it entails is using an ultrasound machine, an ultrasound probe, placing it on the breast, placing some local anesthetic, making a small incision, taking actual slivers of tissue or core biopsy tissue, sending it off to pathology, and making a determination.

So this is an image of a patient of mine who has a left breast mass. And you can see that it is an irregularly shaped mass that's completely hypoechoic and looks suspicious for breast cancer. So what I did in the office is I cleaned her skin, administered some local anesthetic, made a tiny, 2-millimeter stab incision, placed the core needle into her breast, and took several samples of this mass. And I could see it on ultrasound. The samples were placed in formalin and sent to pathology for diagnosis.

Afterwards, I placed a tissue marker into the mass to mark where the biopsy was taken from. Now, these tissue markers are usually or often made out of titanium. They stay in the mass. They're permanent there.

Patients will sometimes ask me, will these markers go off at the airport? And I tell them no, they will not beep at the airport when they're going through security. But the reason why we leave these markers is because it will identify the location of the biopsy for the future if the patient-- for example, if this was a negative biopsy and that it was not cancer, we would know in the future that this mass was indeed biopsied.

It shows up on mammogram and ultrasound. And also, if the patient were to undergo neoadjuvant chemotherapy or chemotherapy before surgery and the cancer completely shrinks away, we'd be able to find where the cancer was by this tissue marker.

Stereotactic core biopsy is another modality for biopsying the breast, where the patient is laying on a table. The radiologist is using mammography to identify the mass. And again, core biopsy tissue slivers are taken from the breast under local anesthetic. The reason why a patient would go for a stereotactic core biopsy is because the mass is not seen on ultrasound. So if the mass is not seen on ultrasound and is only seen on MRI, for example, pure calcifications for something like DCIS, than a stereotactic core biopsy would be modality of choice.

Next, MRI-guided core biopsies can be taken for patients whose masses are only seen on MRI. Sometimes patients will have MRIs done because we know that they already have a breast cancer and we order MRIs for other reasons, whether they have dense breasts or they have a lobular carcinoma and we want to make sure there's no other lesions. And if another lesion is seen and only identified by MRI, then an MRI-guided core biopsy would be needed.

Patients will often ask me if, when I biopsy them, am I going to spread their breast cancer? And the reality of the matter is that yes, you can have needle-tracked seeding. However, it actually clinically does not make a difference. It does not spread the cancer to anywhere outside of the breast.

And most often the tract of the biopsy is removed at the time of surgery. The patients will go on to have radiation, which will kill off any of the residual tumor cells. And some studies have shown that displaced tumor cells don't actually survive in the breast. So I tell patients that it doesn't clinically make a difference in terms of needle-tracked seeding and they should not worry about breast cancer spreading from a core biopsy.

This is just an image of a core needle coming into the breast. Sometimes we use spring-loaded needles and sometimes we use vacuum needles to take samples of the masses. The sample sizes can range from 14 gauge to larger.

And as you can see, we're actually taking slivers of tissue. It's not like fine needle aspirations where we use a 23, 25 gauge needle and are actually just only taking cells. We're actually taking tissue slivers.

So now we have a diagnosis of breast cancer. Breast cancer can be split up into three major categories. The first is Ductal Carcinoma In Situ, or DCIS.

The second is invasive ductal carcinoma. And the third is invasive lobular carcinoma. Once we have a diagnosis of breast cancer, then we will stage the patient further to plan their treatment and we also will evaluate their axilla.

Breast cancer treatment-- what I'll talk to you about kind of-- I split it up into two major categories. The first category is local treatment or local regional treatment. And the second category is systemic treatment. The local regional treatment really focuses on the breast and the axilla with surgery and radiation. And then the systemic treatment goes more into the chemotherapy and hormonal therapy.

So in the past, breast cancer treatment always started with surgery. So a patient had a lump. They'd go to surgery for cancer. And then they would have chemotherapy after that, followed by radiation, and then hormonal therapy.

Nowadays, we are actually studying tumor biology. And that is kind of dictating the order of events when it comes to breast cancer treatment. Often, we'll start with neoadjuvant chemotherapy, if patients are candidates for that, followed by surgery, then radiation and hormonal therapy.

So starting with local treatment and looking into the surgical options, surgery really is divided into two separate categories. The first category is breast conservation, which entails both lumpectomy plus radiation. And the second category is mastectomy.

I'll talk to you a little bit about breast conservation first. Breast conservation, like I said, is a lumpectomy plus radiation. And really, the goals of the surgery, for the surgeon, is to remove the mass, the cancer, with negative margin or healthy, normal breast tissue around it. We also will then use oncoplastic techniques to close the breast tissue underneath the skin so that they have a cosmetically acceptable looking breast. And lastly, they undergo radiation to eradicate any residual disease.

Now, local recurrence after breast conservation is 5% to 10%. Some contraindications to breast conservation therapy include things such as multi-centric disease. So if the patient has cancer in different quadrants of the breast, then they are not a candidate for lumpectomy. If the patient's cancer is very large and the size of the breast is very small, then also, breast conservation is not a good option for them because they would be left with a very deformed and asymmetric looking breast as compared to the other side. And so they really should move on to a mastectomy.

If the patient has diffuse calcifications, it is also a contraindication. If the patient has had radiation in the past, we discourage breast conservation. Because again, conservation includes lumpectomy plus radiation and the patient would not be able to undergo radiation a second time. So they would have to move on to mastectomy.

If the patient is pregnant, breast conservation's not a great option for them not because a lumpectomy cannot be done, but rather because being pregnant, they cannot have radiation. If the patient has breast conservation and starts off with a lumpectomy but the margins come back positive and they need to reexcision, but the reexcision comes back positive, at some point, we counsel patients and tell them that they should move on to mastectomy because we have to continue to take out so much of the breast tissue that again, it's not a really good conservation effort for the breast.

So this picture, I just wanted to show you to demonstrate what we do with lumpectomies these days. We are actually making scars in the periareolar area here, around the areola, so that when they heal, they have a nice cosmetic outcome and the scar is somewhat hidden. Inframammary incisions are also very common, and sometimes axillary incisions, depending on where the cancer is.

So patients will come. They'll have these nice incisions in these hidden areas. They'll have their lumpectomy. The breast tissue, again, using oncoplastic technique, will be re-approximated so they don't have large divots or concavities. And the breast itself would look very cosmetically acceptable.

The second category of surgical options aside from breast conservation is mastectomy. And in the past, mastectomy used to be really the only option. There was only one way of doing mastectomy.

However, nowadays, we have several different kinds of mastectomies that we are performing on patients depending on their needs and desires. And I will go over them. The advantage of mastectomy in some patients is that they often do not need radiation. However, if the cancer is very large, if the margins, the deep margin, in other words, the pectoralis major, is positive or if they have positive lymph nodes, then the patient would likely need radiation.

Local recurrence rate is slightly less than lumpectomy with radiation. However, newer studies are showing that they're actually almost equivalent. And the survival, definitely, between breast conservation and mastectomy are the same.

So this is a picture of a simple mastectomy. And what we do in a simple mastectomy is we remove the nipple and areola complex with a paddle of skin, take all of the breast tissue out from underneath the skin down to pectoralis fascia and remove it. Then we close up their incision in usually a straight or curvilinear fashion.

And they end up with a scar and flat. This patient could go on to wear a prosthetic in their bra that would fit nicely so that in clothing, it would be difficult to tell that they had a mastectomy. Or if desired, she could go on to delayed reconstruction.

Nowadays, we're also doing skin sparing mastectomies where we're taking the nipple and areola complex. We're leaving the entire skin envelope of the breast, taking all the breast tissue underneath the skin down to pectoralis fascia, removing all of that. And then the patient will go on to immediate reconstruction by the plastic surgeon either using a tissue expander or implant or autologous tissue.

Nipple sparing mastectomy is also becoming more commonplace in patients who are candidates to spare their nipple, in which we make incisions in the inframammary fold around the areola or inferior to the nipple and areola complex. We are doing the same surgery. We're removing all of the breast tissue underneath the skin and leaving the nipple and areola complex, in this case, taking the breast tissue all the way down to pectoralis fascia and removing it. Then the plastic surgeon can again do some sort of an immediate reconstruction, either with expanders, implants, or autologous tissue.

Now, this is a picture of a patient who had a mastectomy on the left side and she wanted a delayed reconstruction. So DIEP, or Deep Inferior Epigastric Pedicle, flaps are now being used for breast reconstruction. In the past, a lot of patients would undergo TRAM flaps, where the rectus abdominus muscle would be taken with the skin and fat overlying it. It would be rotated to the opposite side. And a breast mound would be created in that fashion.

The downside of using a TRAM flap is that the rectus muscle is taken, and that actually can compromise the abdominal wall. However, nowadays, with this newer technique of Deep Inferior Epigastric Pedicle, what the plastic surgeon is doing is they're taking the skin and fat of the abdominal area with the inferior epigastric vessels. They're removing it completely and doing a free flap onto the chest wall to recreate a breast mound.

So this is a picture of the same patient who had a reconstruction done on the left side using a deep inferior epigastric pedicle flap. She gets a tummy tuck in the process and a nice, practically symmetrical breast mound on the opposite side. She can go on to have a nipple reconstruction and/or tattooing if she desires. Now of course, patients who do not have enough abdominal fat would not be candidates for this type of procedure.

As I mentioned before, the lymph nodes are very important when it comes to breast cancer evaluation because we know that the risk of metastases to lymph nodes increases, especially with the size of the tumor. And if patients have lymph notes that are positive, that also increases their stage of cancer. So we want to evaluate the lymph nodes.

Aside from palpation of the axilla to evaluate for lymph nodes, ultrasound is a great modality to use for lymph node evaluation. And most of our radiologists are actually doing lymph node evaluation with ultrasound at the time of their breast ultrasound. So they just swing the transducer over to the axilla to evaluate for lymph nodes.

This patient has a completely normal appearing lymph node, with a nice, fatty hilum on ultrasound. This is a patient of mine who has a left sided breast cancer. And I ultrasounded her axilla and her axillary lymph node looks abnormal.

It's kind of plump and round. It does not have a nice fatty hilum. It's homogeneously hypoechoic. And so in the office using the ultrasound, I was able to administer a local anesthetic and take some core biopsies of the lymph node to diagnose that she did indeed have metastatic disease to the lymph node.

Now, in patients who do not have clinically positive lymph nodes-- in other words, a lymph node is not palpated and a lymph node is not seen on ultrasound-- these patients at the time of the breast surgery can go on to a sentinel lymph node biopsy where we are taking out lymph nodes, anywhere from maybe 1 to 7 lymph nodes, to evaluate them for metastatic disease. This is only done on invasive cancers when we're doing lumpectomies. However DCIS is also included if we're doing a mastectomy for DCIS.

The downside of sentinel lymph node biopsy is that patients can have lymphedema. And that's a 2% to 5% risk of lymphedema. Lymphedema rates also go up with radiation. And the reason behind the lymphedema is because we're taking out lymph nodes from the axilla that not only drain the breast, but also drain the arm. And so this is a big problem if it does happen in the patients.

This is an image of a lymphoscintigram of a patient who is going to have a sentinel lymph node biopsy. The patient goes to nuclear medicine. They have an injection of a nuclear dye, which is usually composed of technetium.

And the dye gets injected into the breast itself. It gets picked up by the breast lymphatics and will often localize to the axilla and to axillary lymph node. This will help us to identify the lymph node during surgery when we are removing it.

Also, at the time of the surgery, we can inject an actually physically blue dye called methylene blue or Lymphazurin, into the breast. And again, the dye gets picked up by those lymphatics of the breast. And it migrates to the lymph node and the axilla.

That way, we can identify an actual blue lymph node as well as a hot lymph node. This picture shows intraoperative picture of the axillary lymph note that is physically blue. And this picture demonstrates, using a Geiger counter, which measures radioactivity, to identify a hot lymph node.

Now, some patients will have to go on to axillary lymph node dissection. And these patients that would require it are those who have palpable nodes preoperatively and positive lymph nodes on FNA or core biopsy. So if we know before surgery that their lymph nodes are positive, then at the time of surgery, we would avoid sentinel lymph node biopsy and will go on straight to axillary lymph node dissection, where all of the lymph nodes are removed from the axilla. If the patient has three or more positive sentinel lymph nodes, they would also require an axillary lymph node dissection.

There is a study, we call it the Z11 study, where patients who are stage 1 or 2 breast cancers do not necessarily need to go on to full axillary lymph node dissection. They must be patients who are having breast conservation, so who will go on to have radiation postoperatively. And they cannot have more than two positive sentinel lymph nodes.

The reason why we care about this, ultimately, is because again, the lymphedema rate is a lot higher in axillary lymph node dissection than with sentinel lymph node dissection. The lymphedema rate can range from 10% to 20%, but some studies have even shown up to 30% of patients will develop lymphedema after an axillary lymph node dissection. So if we can avoid it in patients, that would be ideal.

So staying on local, regional control or treatment of the breast cancer, the next therapy modality is radiation. Radiation entails giving high energy x-rays to the breast tissue, sometimes the axilla, to treat any remaining cancer cells that would be in the breast or, again, the axilla. We do it for all lumpectomies, for DCIS or invasive cancer, again, if the tumors are very large, greater than 5 centimeters, or close to the chest wall and if they have axillary lymph nodes that are positive for cancer.

Radiation usually happens after chemotherapy. And there are two different main kinds of radiation that we're giving to patients these days. One is a standard whole breast, which we've given for many, many years. And that is giving radiation to the breast every day, Monday through Friday, for five to six weeks.

Now, partial breast radiation is a newer modality of radiation that we're giving to patients that has them coming to the radiation oncologist treatment center. They receive radiation two times a day, Monday through Friday, for five days. And again, they have to meet criteria for partial breast radiation. But this is a good way of giving radiation to patients.

And sometimes they prefer to come in for five days rather than five weeks. Some side effects mainly include skin affects of redness and dryness as if they've had a really bad sunburn. Fatigue is also an issue, as well.

So these are the different kinds of radiation therapy that we have available to treat patients these days. And I've already mentioned whole breast radiation, again, which is five days a week, once a day, for five weeks.

I will talk a little bit about partial breast radiation. And kind of going over the background of partial breast radiation, why do we do it? Well, we know that we can do partial breast radiation because when patients' cancers come back or when they recur, they tend to recur near or at the primary tumor site. So the question begs, then why can't we just irradiate the area that the cancer is going to come back in, where the cancer would come back, rather than irradiating the entire breast and chest wall and even the axilla if there's no cancer there?

What we've found is that we can actually use partial breast radiation, where only the lumpectomy cavity and the tissue surrounding it will get irradiated and none of the other healthy tissue will get irradiated. Again, it's shorter. It's twice a day for one week. And there's no difference in "elsewhere" failures for partial breast as compared to whole breast radiation. There's three forms, interstitial brachytherapy, intracavitary brachytherapy using a balloon or a catheter base, and lastly, 3D conformal/external beam.

The partial breast radiation guidelines have been published by different societies. And this is just here to show you that they have certain criteria that we follow as to who would be allowed to have partial breast radiation. Interstitial brachytherapy is the oldest method of partial breast radiation. We have over 10-year data.

The way that the catheters are placed in the breast is the patient will go under anesthesia. They'll have local anesthetic administered. And they have these catheters, multiple catheters, that are placed through the breast, through the lumpectomy cavity, to allow for radiation to be given just to the area where the cancer was. The disadvantage is that it can be very uncomfortable for patients and it does require anesthesia.

Balloon brachytherapy is a newer modality that we're using on patients where we actually insert one catheter with a balloon at the end of it through one incision under a local anesthetic in the office under ultrasound guidance. The catheter is placed into the lumpectomy cavity, the balloon is inflated, and the patient receives radiation. The advantage of this is that, again, it's one incision, local anesthetic in the office under ultrasound guidance. Patient has a very good cosmetic outcome.

This is an image of a different kind of catheter that we use besides the MammoSite, the Savi catheter. And this is actually multiple catheter based, where we place this device into the lumpectomy cavity, expand it so that the catheters expand and conform to the lumpectomy cavity. The patient will then go on to have radiation, again, for five days twice a day, and the radiation oncologist will then remove the catheter.

Intraoperative Radiation Therapy, IORT, is a newer modality for radiation where we're actually using this device in the operating room. So patients will come in to the operating room. We'll do surgery. We'll do a lumpectomy.

And at the lumpectomy site, this machine, device, will be placed into the cavity. The cavity will be closed with sutures on the skin. The patient will receive radiation over 20 to 30 minutes at a time, and they will receive their entire dose of radiation, 50 grays. After it's complete, we remove the machine and close up the lumpectomy cavity. Then the patient will go home.

So this is a huge advantage for patients where they would come and have their radiation done in the operating room. They're not even awake for it. It's a one time deal. And they go home and not need radiation in the future.

The downside of this treatment modality is that we don't actually, at the time of surgery, know if the patient's margins are negative for cancer. So if the patient comes back with a positive margin, then they may need to go back for more surgery. They may need to go back for more radiation.

So moving onto systemic treatment for breast cancer, I'll talk about chemotherapy and hormonal therapy. So chemotherapy-- as I had mentioned before, in the past, patients used to always get chemotherapy after surgery, so in an adjuvant setting. However, nowadays, we're looking at tumor biology to determine whether or not certain patients can have chemotherapy neoadjuvantly or before surgery.

So when I mention tumor biology, what I mean by that is we're looking at hormonal receptors, things like estrogen receptor, progesterone receptor, and HER2Neu receptors to see if they are positive or negative. And that will determine what kind of chemotherapy or hormonal therapy they are candidates for. So in certain patients who have cancers that are greater than two centimeters, if they are triple negative-- in other words, ER, PR, and Her2Neu negative, these patients would be a candidate for chemotherapy preoperatively.

Now, in certain patients where their Her2Neu is positive, they can undergo chemotherapy plus Herceptin and Perjeta. Perjeta is a newer medication that we're using. It's been FDA approved for patients who have cancers that are greater than two centimeters and are Her2Neu positive. These patients can receive Perjeta in the neoadjuvant setting.

And we've found that a lot of these patients will have pathologic complete responses. In other words, when we go back to do their lumpectomy, the pathologist will go back, find the clip, the tissue marker that we left behind at the time of biopsy, and find that there's no more cancer there in that breast in the lumpectomy specimen. Also, we're finding that even in the axillary lymph nodes, when we remove them after neoadjuvant chemotherapy and therapy with Perjeta, there's no residual cancer in the axilla either.

So it's a great medication that we have right now to treat patients in the neoadjuvant setting. Perjeta is not really being used in the adjuvant setting just because the studies have not been done there. And so we like to give it to patients who are candidates.

Why do we give neoadjuvant chemotherapy? Well, there's multiple reasons, not just to see if patients can have complete pathologic responses to medications like Perjeta, but also to start treating the patient systemically and to see if we can shrink tumors that might otherwise require mastectomies and convert them into patients who can have breast conserving therapy with lumpectomy followed by radiation. If the cancer, however, grows on neoadjuvant chemotherapy, they would move on to surgery.

Now, we also do give patients who don't meet the criteria for neoadjuvant chemotherapy adjuvant chemotherapy and hormonal therapy. So chemotherapy is given to patients who have high risk cancers that are high grade, positive lymph nodes. And we look at their oncotype, which is actually looking at the tumor cell genetics itself.

And if they are triple negative, they'll receive traditional chemotherapy. If they have hormone positivity with estrogen, progesterone, or Her2Neu receptors positive, they will go on to endocrine therapy, as well. If they're Her2Neu positive, again, they'll receive Herceptin. But Perjeta's not really available in the adjuvant setting. Now, for estrogen receptor and progesterone receptor positivity, patients will go on to have tamoxifen or Arimidex for 5, sometimes even 10 years now.

So other considerations when it comes to breast cancer and counseling women. Young women can go to have fertility preservation before treatment, before chemotherapy, so that they can have their oocytes retrieved and preserved. And then after they're done with their breast cancer treatment, they can go on to try to conceive with these preserved oocytes.

I do want to talk about genetic testing because it is actually a huge topic. And there's a lot of new data coming out with genetic testing and counseling. I'm not going to go over this slide in detail, but the NCCN guidelines are guidelines that were used to determine which patients should have genetic testing.

This is the latest version from February 2016. And there have been some newer additions and changes. The main ones that I'd like to point out are that patients who have a family history of pancreatic cancer and prostate cancer may be at higher risk for breast cancer, as well.

So in the past, we used to only talk about breast cancer, BRCA positivity, ovarian cancer, and whether or not they have a family heritage of being Ashkenazi Jew. But nowadays, even pancreatic cancer and prostate cancer matter. So even when I do my very quick, superficial screening of patients, I'll ask them, do you have a family history of prostate cancer or pancreatic cancer? And if so and they fit into these NCCN guidelines and criteria for genetic testing, I will send them off to a genetic counselor.

Why genetic testing matters is because we know that in particular for BRCA 1 and 2, patients who have positivity for these genes will have increased lifetime risk of breast cancer as well as ovarian cancer. So a lot of these patients will go on to consider bilateral mastectomies, even in a prophylactic situation, as well as bilateral oophorectomy. One thing that I must point out, however, is that BRCA 1 and 2 positivity accounts for only 50% of patients who have genetic predisposition for breast cancer. We are testing patients with an extended panel of genes to see if they have any of the other genes, the other 50% of the genes, that may give them an increased risk of breast cancer in their lifetime.

Why I want to tell you this and talk to you about this is because I think it's very important that we send patients who have a possibility of meeting criteria for genetic testing to genetic counselors. We have John Muir certified genetic counselors who are very good at their jobs. They are very good at counseling patients. And they can help determine whether or not patients would require gene testing. And they're often ordering not just BRCA 1 and 2 tests, but this extended panel, and then further counseling patients if they come back positive with any of these genes.

Follow up for these patients happens very frequently in the beginning, so in the first year to three years. And then we follow them up even to five years and beyond. Most often, the medical oncologist will follow patients for every six months. As surgeons, we kind of taper off to yearly follow ups after a couple of years.

So this is my last slide and I kind of want to end with this. But before I read you the quote, what I do want to mention is that breast cancer is very complicated these days. It's changed in the last 5 to 10 years, even.

And it's really a team sport. Breast cancer detection starts with the primary care physician or the OB/GYN or even the patient themselves. And then it moves on to include the breast surgeon, sometimes a plastic surgeon, the radiation oncologist, and the medical oncologist. So we are really working in a multi-disciplinary forum to counsel these patients and to talk to them about their disease and to help them get through the process of treatment.

So to quote a colleague, Dr. Cary Kaufman, who's a breast surgeon in Washington, breast surgery has changed in the last 5 to 10 years and the role of the breast surgeon has also changed. "A breast surgeon in 2016 combines the surgical skills of a plastic surgeon, the knowledge of a medical oncologist, the imaging capabilities of a breast radiologist, the emotional sensitivity of a psychotherapist, the patience of a teacher, and the warmth of a mentor." Thank you.