

DEPARTMENT OF DERMATOLOGY

Mohs Surgery

Educational information for patients



Thank you for choosing the OHSU Department of Dermatology to provide your dermatologic care.

Since the 1920s, the Department of Dermatology has been educating doctors, researching skin diseases and providing world-class care to patients in Oregon and beyond. We thank you for trusting us with your care.

The surgeons and staff within the department welcome you. We have prepared this educational information to answer the most common questions presented to us by our patients. If you have additional questions after reading this material, please let us know.

Some of the questions addressed include:

- What is skin cancer?
- What is Mohs surgery?
- How do I prepare for Mohs surgery?
- What happens the day of surgery?
- What type of wound will I have and how will I care for that wound after surgery?
- What measures can I take to prevent future skin cancer?

What is skin cancer?

Cancer is the abnormal growth of cells at an uncontrolled and unpredictable rate. The cancer tissue usually grows at the expense of surrounding normal tissue. The abnormal growth (cancer) originates in the uppermost layer of the skin and may grow downward, forming root and finger-like projections under the surface of the skin. Unfortunately, these roots may be subtle and unable to be seen without the aid of a microscope. Therefore, what you see on your skin is sometimes only a small portion of the total cancer.

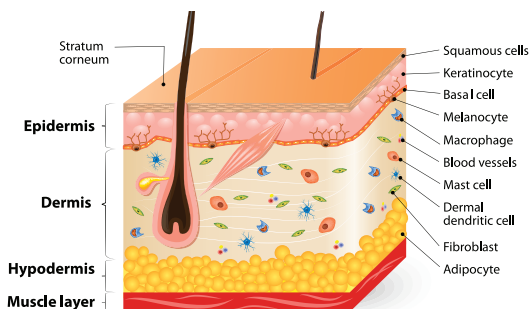
The most common types of skin cancer are basal cell carcinoma and squamous cell carcinoma. The names reflect the cell within the skin from which the particular type of cancer originates. A less common type of skin cancer is malignant melanoma, which usually appears as a dark colored spot or bump on your skin and slowly enlarges. At the OHSU Department of Dermatology, we treat skin cancers of all kinds.

The most common cause of skin cancer is long-term exposure to sunlight. This is why skin cancers develop most often on the face and arms (sun-exposed body parts). They also occur more commonly in fair-skinned people than dark-skinned people. Superficial x-rays, which were used many years ago for treatment of certain skin diseases, may result in skin cancer many years later. Trauma (scars), certain chemicals and rare inherited diseases may also contribute to the development of skin cancer.

What are basal cell and squamous cell carcinomas?

There are several different types of basal and squamous cell carcinomas (cancers), which may affect the type of treatment. It is important to distinguish these types so a biopsy is usually performed prior to treatment.

Both of these cancers behave and are treated similarly. The difference lies in the cell from which it originates within the skin. Often, this can only be distinguished by examining the skin under a microscope. Basal cell carcinoma is the most common cancer of any type, accounting for about 80% of all skin cancer cases. Both basal and squamous cell carcinomas most commonly occur on the head and neck but can occur anywhere. It often begins as a small bump that can look like a pimple, but will continue to enlarge, often bleeds and does not heal completely. It may be red, skin-colored or darker than the surrounding skin. Basal cell carcinoma rarely spreads (metastasizes) to distant parts of the body. Instead, it grows larger and deeper, destroying nearby parts of the body in its path. Squamous cell carcinoma behaves locally like basal cell carcinoma. However, certain squamous cell carcinomas can metastasize (spread elsewhere) from the skin. This will be discussed with you prior to surgery.



What is melanoma?

Melanoma is the deadliest skin cancer accounting for two-thirds of all skin cancer deaths. The standard treatment for melanoma is surgical removal of the melanoma and an area of normal appearing skin surrounding the melanoma. Many melanomas have poorly defined borders making standard excision (removal) difficult. It is in these special cases, especially on the head and neck region, where Mohs micrographic surgery (or just 'Mohs surgery,' explained later) is beneficial in the treatment of melanoma.

How successful is the treatment of skin cancer?

Initial treatment of skin cancer has a greater than 90 percent cure rate. Methods commonly used to treat skin cancer include excision (surgical removal and stitching), curettage and electrodesiccation (scraping and burning with an electric needle), cryosurgery (freezing) and radiation therapy ("deep x-ray"). There is also an advanced technique called Mohs surgery. Many



skin cancers are easily and effectively treated by the other methods previously mentioned and do not require Mohs surgery. The method chosen depends upon several factors, such as the microscopic pattern of the cancer, the location and size of the cancer and how best to minimize the chance of recurrence.

What is Mohs surgery?

In the early 1940's, Dr. Fredrick Mohs, a professor of surgery at the University of Wisconsin, developed a form of skin cancer treatment he called chemosurgery. When Dr. Mohs initially introduced the procedure, he applied a chemical (zinc chloride) to the tumor and surrounding skin, which fixed the tissue prior to its removal. Today, the word "chemosurgery" is no longer accurate. Since 1974, the procedure has been refined and improved upon. The addition of "Mohs" honors the doctor who developed the technique. It is now usually referred to as Mohs micrographic surgery.

Since initial treatment options have high success rates, the use of Mohs surgery is intentionally reserved for specific situations. It is used for skin cancer that has come back after being treated by another method, or is in an area where it is important to preserve healthy tissue for maximum functional and cosmetic result, such as eyelids, nose, ears, lips, fingers, toes and genitals. If a skin cancer comes back after it has been treated by a method other than Mohs, retreating using one of the other methods has a success rate of less than 75 percent. However, the success rate for Mohs surgery, even in treating these recurrent cancers, is about 97-98 percent.

Mohs surgery is performed by a team of medical personnel that includes physicians, nurses and technicians. All OHSU physicians heading the team have subspecialty surgical training (fellowship) in the technique and are recognized by the American College of Mohs Micrographic Surgery. Other physicians on the team include fellows and residents who assist while learning the technique. The nurse is an important part of the team who will help answer your questions, respond to your concerns, assist in surgery and instruct you in the dressing and wound care after the surgery is performed. A technician performs the important task of preparing the tissue slides, which are examined under a microscope by the Mohs surgeon.

What is the procedure for Mohs?

The procedure begins by injecting the area with a local anesthetic so there is no pain during the procedure. To remove most of the visible skin cancer, the tumor is scraped using a sharp instrument called a curette. A disc-shaped piece of tissue is then removed with a scalpel around and underneath the scraped skin and carefully



divided into pieces that will fit on a microscopic slide. The edges are marked with colored dyes, a careful map or diagram of the removed tissue is made and the tissue is then submitted for frozen section processing. Most bleeding is controlled using pressure and electrocautery, although occasionally a small blood vessel is encountered which must be tied using a suture. A pressure dressing is applied and the patient is asked to wait while the slides are being processed. The surgeon will then examine the slides under the microscope and be able to tell if any tumor is still present. If cancer cells remain, they are noted on the detailed map. Another section of tissue is then removed and the procedure is repeated until the physician determines that the entire base and sides of the wound have no cancer cells remaining. This process preserves as much normal, healthy tissue surrounding the skin as possible.

The removal and processing of each layer of tissue takes approximately one hour. Only 20 to 30 minutes of that is spent in the actual surgical procedure. The remaining time is required for slide preparation and interpretation. It usually takes one to three stages to complete the surgery. Therefore, by beginning early in the morning, Mohs surgery is generally finished in one day. However, sometimes a tumor may be extensive enough to necessitate continuing surgery a second day.

At the end of Mohs surgery, you will be left with a wound. Several reconstruction options will be discussed with you in order to provide the best possible cosmetic result. The reconstruction is usually performed on the same day.



Reconstruction possibilities include:

- *Healing by granulation* involves letting the wound heal by itself. Experience has taught us that there are certain areas of the body where nature will heal a wound as nicely as any further surgical procedure. There are also times when a wound will be left to heal knowing that if the resultant scar is unacceptable, some form of reconstructive surgery can be performed at a later date.
- *Closing the wound with stitches* is often performed on small- to medium-size wounds. This involves some adjustment of the wound and sewing the skin edges together with a combination of deep and superficial sutures. This procedure speeds healing and can offer a good cosmetic result. For example, the scar can lie along a wrinkle line. However, the scar line may be longer than what you may have expected.
- *Skin grafts* involve covering a surgery site with skin from another area of the body. There

are two types of skin grafts. The first is called full thickness graft and requires a thicker layer of skin to achieve proper results. In this instance, skin is usually removed from around the area or distant site (the donor site) and stitched to cover the wound. The donor site then is sutured together to provide a good cosmetic result. The second graft type is the split-thickness graft. This is a thin shave of skin, usually taken from the thigh, which is used to cover a surgical wound. This can be either a permanent coverage or temporary coverage before another cosmetic procedure is done at a later date.

- *Skin flaps* involve movement of adjacent, healthy tissue to cover a surgical site. Where practical, they are chosen because of the excellent cosmetic match of nearby skin.

Mohs surgery for the treatment of melanoma is similar for other skin cancers. With melanoma, however, an additional rim of tissue is removed for histological (microscopic) examination that can take a few days to process. This additional step allows for a more precise treatment of the melanoma. **As a result, the reconstruction will usually be delayed until this final rim of tissue is cancer free.**

In summary, by microscopically pinpointing affected areas and removing these tissues, the Mohs surgeon can successfully remove your skin cancer. Because normal tissue is preserved to the greatest extent possible, the Mohs surgeon is able to offer you the possibility of a good cosmetic result. Although an attempt will be made to minimize the scar, you will be left with a scar of some kind.

How do I prepare for the day of surgery?

The best preparation for Mohs surgery is a good night's rest followed by breakfast, unless otherwise directed. For example you may be asked to not eat if you're having a procedure on the same day where general anesthesia will be used. Please take a shower the night before or morning of your surgery. Be sure to clean the surgical area well. Please wash your surgical site with antibacterial soap if safe to do so. Avoid using any products like moisturizers or makeup. For surgeries on the scalp, be sure to shampoo well and avoid using any hair products.

In most cases, the surgery will be completed on an outpatient (clinic) basis. If you wish to have an anti-anxiety medication, it can be given to you at the discretion of your surgeon before the surgery begins. Because you can expect to be here for most of the day, it is wise to bring along a book, magazine or laptop. We have a wireless network for your convenience. Also, because the day may prove to be quite tiring, it is advisable to have someone accompany you the day of surgery to provide companionship and a ride home. If you are given an anti-anxiety medication, we require that someone else drive you home.

Depending on your case, you may have a preoperative visit to discuss your surgery. At this visit, the technique will be discussed in detail, you will meet the team performing the surgery, a biopsy may be performed (if it has not already been done) and necessary paperwork will be finished (consents, insurance forms, etc.).

If you are new to our clinic, you will receive a map, travel instructions and form to complete about your medical history and medications. Please fill these out and bring them with you on the day of surgery.

We request that you stop taking any aspirin or ibuprofen compounds (like Anacin, Bufferin, Advil or Motrin) at least one week before your surgery. This is because it may interfere with the normal blood clotting mechanism, making you bleed more than normal during surgery. If your doctor recommends aspirin, please verify with your doctor before discontinuing aspirin. If you are on medically necessary blood thinners such as Warfarin (Coumadin), Clopidogrel (Plavix), Dabigatran (Pradaxa) or others, we do not usually recommend you stop taking them for this procedure. Exceptions may be made for large tumors or other circumstances. Please discuss what is best for you with your doctor. Alcohol also increases your bleeding risk so please discontinue at least one day prior to surgery.

Most insurance carriers cover the cost of Mohs surgery and reconstruction. OHSU bills are split into two parts — one for the place where you receive care and the other for the services provided by your surgeon. Please be prepared to give insurance information to our billing office and bring any forms that may need processing. We can counsel you concerning your insurance coverage at the time of surgery. If your insurance plan requires pre-approval or an HMO referral, please help us to make sure this is in place prior to your surgery.

What happens the day of surgery?

Your appointment has purposefully been scheduled early in the day. Upon your arrival on the 5th floor of the Center for Health & Healing, you should proceed to the check-in desk under the teal disk (at the far end of the building). When the surgical suite becomes available, our medical staff will escort you to that area of clinic. If you have not had a consultation visit, we will go through the procedure with you, examine the questionnaire you have filled out and answer any questions you have.

After preliminary preparation of the skin, you will lay on the surgical table and the area around your skin cancer will be anesthetized (numbed) using a local anesthetic (a shot). This may be uncomfortable, but usually this is the only pain you will feel during the procedure. Once the area is numbed, a disc shaped piece of tissue will be removed and the bleeding controlled. The tissue will be carefully handled by the surgeon, diagrammed and sent to the technician to be processed into microscopic slides. A pressure dressing will be placed over your surgical wound and you will wait in the reception area. On average, it takes an hour for the slides to be prepared and studied. During this time you may rest, read, use our wireless network or take a walk around the building. There is a café and coffee bar located on the first floor.

Most Mohs surgery cases are completed in one to three stages. You will be re-anesthetized for each stage needed. Each stage involves the removal and microscopic evaluation of your skin for cancer. Once we are sure that we have totally removed your skin cancer, we will discuss our

recommendations with you for caring for your surgical wound. Often, the wound can be closed the same day.

What can I expect after the surgery is complete?

Pain

Most people are concerned about pain. The majority of people will experience remarkably little discomfort after surgery. Due to its potential to cause bleeding, we request that you do not take aspirin for pain, but use a Tylenol or a Tylenol-like painkiller. In some cases a stronger pain medicine will be prescribed. If pain persists or develops several days after the surgery, you should notify our office.

Bleeding

A small number of patients will experience some bleeding after surgery. It usually can be controlled by the use of pressure. You should take a gauze pad and apply constant pressure over the bleeding point for 20 minutes. Do not lift up or relieve the pressure during that period of time. If bleeding persists after continued pressure for 20 minutes, repeat the pressure for another 20 minutes. If this fails, a doctor can be reached 24 hours a day by calling 503 494-9000 and asking for the dermatologist on call. If necessary, visit a local emergency room for assistance. Your wound care instructions will also list phone numbers, if you have questions.

Complications

There are some minor complications that may occur after Mohs surgery. A small red area may develop around your wound. This is normal and

does not necessarily indicate infection. However, if the redness becomes worse, pain around the wound begins to increase, or if the wound begins to drain pus, please notify our office.

Itching and redness around the wound, especially in areas where adhesive tape has been applied, are common. If this occurs, ask your pharmacist for non-allergic tape and let us know about this complication on your return visit.

Swelling and bruising are very common following Mohs surgery, particularly when performed around the eyes and mouth. This usually subsides within four to five days after surgery and may be decreased by the use of an ice pack in the first 24 hours.

Numbness

At times, the area around your operative site will be numb to the touch. This area of numbness may persist for several months or longer and in some instances, be permanent. For most, sensation returns after one year. If you have concerns, please discuss it with your doctor at your follow-up visit.

Although every effort will be made to offer the best possible cosmetic result, you will be left



with a scar. The scar can be minimized by the proper care of your wound. We will discuss how to take care of your wound care in detail and give you specific wound care instructions.

Will I develop more skin cancers?

After having skin cancer, statistics show that you have a higher chance of developing another. The damage your skin has already received from the sun cannot be reversed. However, there are precautions that can be taken to prevent further skin cancers. They involve good common sense. You should use a sunscreen; applying it at least 10 minutes before exposure to light. Higher SPF numbers are more protective. We recommend that you use a sunscreen that protects against both UVA and UVB with a SPF of 30 or higher. Regardless of manufacturers' claims, we recommend that you reapply sunscreen after swimming. A wide brimmed hat, long-sleeved shirt and other protective clothing are also appropriate. Avoiding excess sunshine is recommended.

You should have your skin checked very closely by a dermatologist at six-month intervals. Our policy is to follow the majority of our patients until the wound is healed. Once the wound is healed, patients can continue with their referring physician. If you have not yet established care with a dermatologist, your surgeon can give you a referral. We recommend six-month follow-up visits for two years, then yearly. Of course, any areas of your skin that change, fail to heal or just concern you should be brought to the attention of your referring dermatologist immediately. He or she can adequately treat most small skin cancers when they are detected early.

Your Mohs surgery providers

Anna A. Bar, M.D.



Dr. Bar is an assistant professor of dermatology and co-director of Mohs Micrographic Surgery. Dr. Bar is the Director of the fellowship program in Mohs Micrographic Surgery and Dermatologic Oncology, and has trained fellows since 2006 in this advanced technique. Dr. Bar specializes in skin cancer surgery, including Mohs micrographic surgery and the subsequent reconstruction. She also has advanced training in laser and cosmetic surgery, fillers, and scar revision.

Dr. Bar received her medical degree from New York University medical school, followed by an internal medicine internship at New York's Lenox Hill Hospital. After completing dermatology training at OHSU, she pursued additional fellowship subspecialty training in Mohs surgery and cosmetic and laser surgery at the California Skin Institute. Dr. Bar has lectured and taught courses for physicians at the national meetings of the American Academy of Dermatology, the American Society of Dermatologic Surgery, and the American College of Mohs Micrographic Surgery. She has authored book chapters and articles about skin cancer and cosmetic dermatology. She regularly instructs other doctors, residents and medical students in skin cancer surgery.

Justin J. Leitenberger, M.D.



Dr. Leitenberger is an assistant professor of dermatology, co-director of Mohs Micrographic Surgery, and co-director of the High-Risk Non-Melanoma Skin Cancer Clinic. Dr. Leitenberger

specializes in skin cancer treatments, including Mohs surgery and reconstructive surgery. He also performs laser and cosmetic surgery, including minimally-invasive laser skin resurfacing as well as injectable fillers and neurotoxins.

Dr. Leitenberger received his medical degree from the University of Texas at Houston, during which time he received a prestigious Doris Duke Clinical Research Fellowship Award at the University of Texas Southwestern Medical Center at Dallas. He completed both his dermatology residency and surgical fellowship subspecialty training at OHSU. Dr. Leitenberger has lectured nationally at the American Academy of Dermatology and the American College of Mohs Surgery on dermatologic surgery safety, high-risk skin cancer in solid organ transplant recipients, and collaborative management of locally advanced skin cancer. He has authored text book chapters on skin surgery and scar revision techniques.

Wesley Yu, M.D.



Dr. Yu is an assistant professor of dermatology, specializing in surgical treatment of skin cancers including melanoma. He is a fellowship-trained Mohs Micrographic surgeon with advanced training in

reconstructive surgery. Along with surgical treatment of skin cancers, Dr. Yu has research interests in investigating new skin cancer treatments and regularly instructs medical trainees.

Dr. Yu received his medical degree from the University of California San Francisco (UCSF), before completing his dermatology residency at UCSF. He then completed his fellowship in Mohs Micrographic Surgery and Dermatologic Oncology at Case Western Reserve University Hospitals in Cleveland, Ohio.



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Vision Statement

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