

# Mohs' Micrographic Surgery

*An advanced form of skin cancer removal*

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## SUMMARY

**Mohs' micrographic surgery is a method for removing cutaneous carcinomas. Its success depends on the fact that many tumors spread contiguously. Basal cell carcinoma is the prototype of tumors treated in this way, but the list is growing. Some physicians include melanoma in the list of tumors suitable for this surgical technique.**

## RÉSUMÉ

**La technique chirurgicale micrographique de Mohs est une méthode permettant l'exérèse des carcinomes cutanés. Son succès repose sur le fait que de nombreuses lésions tumorales se propagent par contiguïté. Le carcinome basocellulaire est le prototype des tumeurs traitées par cette technique mais la liste s'allonge. Pour certains médecins, le mélanome fait maintenant partie de la liste des tumeurs opérables par cette technique chirurgicale.**

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APPROXIMATELY 60 YEARS AGO, at the University of Wisconsin, Frederick E. Mohs serendipitously discovered the technique of *in vivo* fixation

of tissue by using a fixative paste with a zinc chloride base. He used this paste to treat skin cancers in patients and called the technique "chemosurgery." The procedure initially required the tissue to be fixed *in situ*, thus rendering a bloodless surgical field. The tissue was removed, and frozen sections were cut, stained, and reviewed; then, more paste was applied to the areas of residual tumors and the procedure was repeated. Frozen sections were cut horizontally rather than in the traditional vertical fashion, allowing for the entire surgical margin to be viewed.<sup>1</sup>

Only one layer could be removed, however, every 24 hours; histological preparations were less than ideal; and patients experienced significant pain during the fixation process. The technique was not tissue-sparing, and immediate repair of the surgical defect was prevented. As a result, Dr Mohs, as well as Drs Ted Tromovitch and Sam Stegman,<sup>2</sup> tried omitting the zinc chloride paste and using local anesthetic. They found that this modification – known as the "fresh tissue technique" – overcame the previous difficulties. Ninety-nine per-

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cent of all micrographically controlled surgery now uses the fresh tissue technique. The term chemosurgery has been changed to "Mohs' micrographic surgery."

Most dermatological programs in the United States provide the rudiments for a resident to learn this technique. Many have started a 1- to 2-year "Mohs'" fellowship – open to residents who have completed training in dermatology and who are interested in obtaining additional training. Recently, at the University of British Columbia, a 1-year fellowship was also started. Local provincial licensing authorities determine who can perform the technique. The requirements vary from province to province, and candidates wishing to perform the technique must demonstrate their expertise. At present, 12 physicians perform Mohs' micrographic surgery in Canada.

## Procedure

Mohs' micrographic surgery is excision with frozen section control. Several important changes in normal surgical techniques significantly improve the cure rate. The procedure is performed on outpatients receiving local anesthesia; hence, patients who are poor candidates for general anesthesia can have surgery. Also, the outpatient setting can decrease patient anxiety. The surgeon acts as a pathologist, allowing 1-day treatment of skin cancer in most cases.

After the patient has been placed in a comfortable position on the operating table, the surgical area is prepped with antiseptic and local anesthesia is induced. The tumor is then debulked, usually with a curette. A thin layer of apparently normal tissue is then removed from the sides and the base of the defect with a scalpel or carbon dioxide laser.

**Table 1. INDICATIONS FOR MOHS' MICROGRAPHIC SURGERY**

- Basal cell carcinomas<sup>a</sup>
- Squamous cell carcinomas<sup>a</sup>
- Extramammary Paget's disease<sup>a</sup>
- Bowen's disease
- Dermatofibrosarcoma protuberans
- Microcystic adnexal carcinoma
- Atypical fibroxanthoma
- Oropharyngeal carcinoma
- Hemangiosarcoma
- Keratoacanthoma
- Sebaceous carcinoma
- Malignant fibrous histiocytoma
- Malignant lentigo<sup>b</sup>
- Melanoma<sup>b</sup>
- Sebaceous gland carcinoma
- Leiomyosarcoma
- Sweat gland tumor

<sup>a</sup>Treatment of choice in areas of high recurrence

<sup>b</sup>Controversial

The sides of the excision are bevelled so that, when the tissue is flattened during histological staining, the sides and base of the defect are in the same plane. Depending on the size of the segment excised, which in turn depends on the size of the neoplasm, the segment may need to be subdivided into smaller specimens that can be easily

handled by the technician. The specimens are then color-coded by a variety of marking agents (eg, merbromin, double concentrated hematoxylin, tattoo dye, India ink). This allows for more precise localization of the tumor within the specimen. Frozen sections are then cut horizontally off the base of the blocks, stained with hematoxylin and eosin or toluidine blue, and analyzed by the surgeon.

Areas of persistent tumor are recorded on the map, which is used to guide removal of further tissue. This process is repeated until the entire tumor has been removed. Once this is accomplished, the surgeon then reconstructs the defect by local flaps, grafts, or allows the wound to heal by secondary intention.

The most significant difference between this method and the standard frozen tissue technique is the use of horizontal sections. This allows a convergence of a three-dimensional tissue section into a two-dimensional frozen section, revealing the entire surgical margin. Traditional histopathological sectioning is tantamount to selecting random slices from a loaf of bread. Of course, small tumor strands might be missed in traditional sections.

Other differences include the proximity of the patient, surgeon, technician, cryostat equipment, and microscope. Environmentally, proximity can pose a concern, as many chemicals are strong irritants. Air flow studies performed in our laboratory, however, indicate that all chemicals used in staining are at undetectable or well below toxic levels.

Mohs' micrographic surgery is time-consuming; consequently, it can be expensive. Because it is performed in an office-based setting, however, costs are diminished. The cost of micrographic surgery can be easily equated with the costs involved in radiation treatment or with excision and repair in a hospital operating theater.

### Indications

The main indications for Mohs' micrographic surgery are found in *Table 1*.

**Basal cell carcinoma.** Numerous treatments are available for basal cell carcinomas. Essentially, Mohs' surgery should be considered when any feature of the tumor

suggests the chance of a cure is less than 90% to 95%.<sup>3</sup> These features include:

- tumor location, such as in embryonic fusion planes (inner canthi, nasal labial folds, preauricular and retroauricular sulci, lips, chin, and filtrum), nasal alae, periocular areas, ear, forehead, or scalp;
- clinical appearance, such as more than 2 cm in diameter and poor margination;
- histological appearance of the carcinoma includes infiltrating, spindling, sclerosing, morpheic, invasive, metatypical, perineural features;
- young, cosmetically concerned patients with a lesion in a sensitive area;
- recurrent or incompletely excised tumors; and
- tumors occurring after radiation therapy.

### **Squamous cell carcinomas.**

Squamous cell carcinomas tend to be locally invasive and metastasize late. Thus, they can be treated similarly to basal cell carcinomas. The cure rate of Mohs' micrographic surgery for squamous cell carcinomas is approximately 95%.

Invasive and in situ squamous cell carcinomas of the penis and vulvae constitute a special group of tumors that can extend beyond the clinical limits. Mohs pioneered the use of micrographic surgery in this group, and many consider it to be the treatment of choice. This group of tumors is treated with the fixed tissue technique rather than the frozen tissue technique.

**Melanoma.** The treatment of melanoma by Mohs' micrographic surgery has been controversial.<sup>4</sup> This controversy has stemmed from the difficulty in analyzing melanoma cells processed by frozen section. Also, authors previously thought melanomas frequently metastasized early. It is

now clear that melanomas grow contiguously before systemic spread. This belief has been reinforced by the excellent cure rate of melanoma treated by Mohs' micrographic surgery.

**Other tumors.** Many tumors have shown excellent results if removed by Mohs' micrographic surgery. The method has also yielded excellent results in difficult to treat areas, such as the conchae of the ear.

### **Conclusion**

Mohs' micrographic surgery is an advanced surgical technique that combines the specialties of pathology and dermatological surgery in the management of cutaneous carcinomas. Mohs' cure rates exceed the cure rates of conventional surgical excision and radiation treatment. The technique is maximally aggressive, yet tissue sparing, offering the best cosmetic results. Costs are equivalent to those for radiation therapy or for excision and repair in a hospital operating theater. ■

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# **SERC**<sup>®</sup>

**(Betahistine hydrochloride) TABLETS**

**INDICATIONS:** SERC may be of value in reducing the episodes of vertigo in Meniere's disease. No claim is made for the effectiveness of SERC in the symptomatic treatment of any form of vertigo other than that associated with Meniere's disease. It also has not been established that betahistine has any effect on other manifestations of Meniere's disease.

**CONTRAINDICATIONS:** Several patients with a history of peptic ulcer have experienced an exacerbation of symptoms while using SERC. Although no causal relation has been established, SERC is contraindicated in the presence of peptic ulcer and in patients with a history of this condition. SERC is also contraindicated in patients with pheochromocytoma.

**PRECAUTIONS:** Although clinical intolerance to SERC by patients with bronchial asthma has not been demonstrated, caution should be exercised if the drug is used in these patients. SERC should not be used concurrently with antihistamine agents, since no information is available with regard to the possible interaction of these drugs.

**USE IN PREGNANCY:** The safety of SERC in pregnancy has not been established. Therefore, its use in pregnancy or lactation, or in women of child-bearing age requires that its potential benefits be weighed against the possible risks.

**ADVERSE REACTIONS:** Occasional patients have experienced gastric upset, nausea and headache.

**DOSAGE AND ADMINISTRATION:** The usual adult dosage has been one to two tablets (4 mg each) administered orally three times a day. The dosage has ranged from two tablets per day to eight tablets per day. No more than eight tablets are recommended to be taken in any one day.

SERC (betahistine hydrochloride) is not recommended for use in children. As with all drugs, SERC should be kept out of reach of children.

**HOW SUPPLIED:** Scored tablets of 4 mg each in bottles of 100 tablets.

Full Product Monograph available upon request.

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