

The intent of these illustrations is to demonstrate how Mohs Micrographic Surgery provides the highest cure rate and preserves as much normal skin as possible versus standard excision techniques performed by other surgeons.

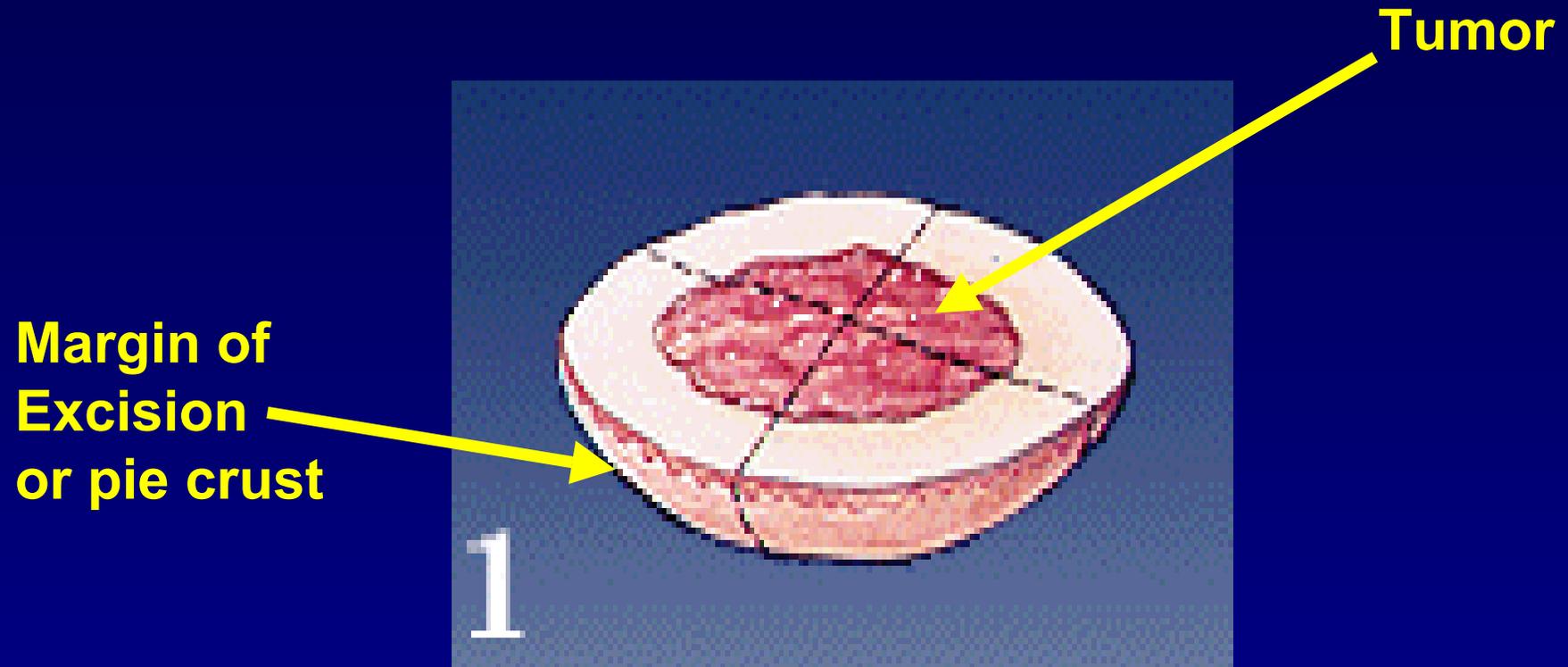
This high cure rate is achieved because 100% of the margin of excision is examined versus **less than 1%** of the margin in the standard excision. In addition, the Mohs surgeon serves as the surgeon, pathologist, and reconstructive surgeon so that he/she has definitive control of the tissue orientation and mapping to maximize accuracy. This allows the Mohs surgeon to remove a smaller amount of normal tissue. The dermatologist or plastic surgeon depends on a pathologist in another room at another time to study the tissue and relay the information regarding the excision margin.

The following illustrations will compare Mohs tissue processing to standard tissue processing.

First, we will examine the tissue specimen in the Mohs Micrographic Surgery procedure. A real example of this approach can be viewed from clicking the link at the Mohs surgery section of the website.

Second, we will examine the standard pathology approach performed by all other laboratories located in hospitals or outside pathology labs. This illustration applies to both frozen section (immediate result) and permanent section (takes 2-7 days for the results) techniques.

Mohs Micrographic Surgery Tissue Processing Details



The tissue is excised in the shape of a pie. This will allow 100% of the surgical margin or “crust of the pie” to be examined. The “filling of the pie” is not examined because it is not important in assessing the margin.

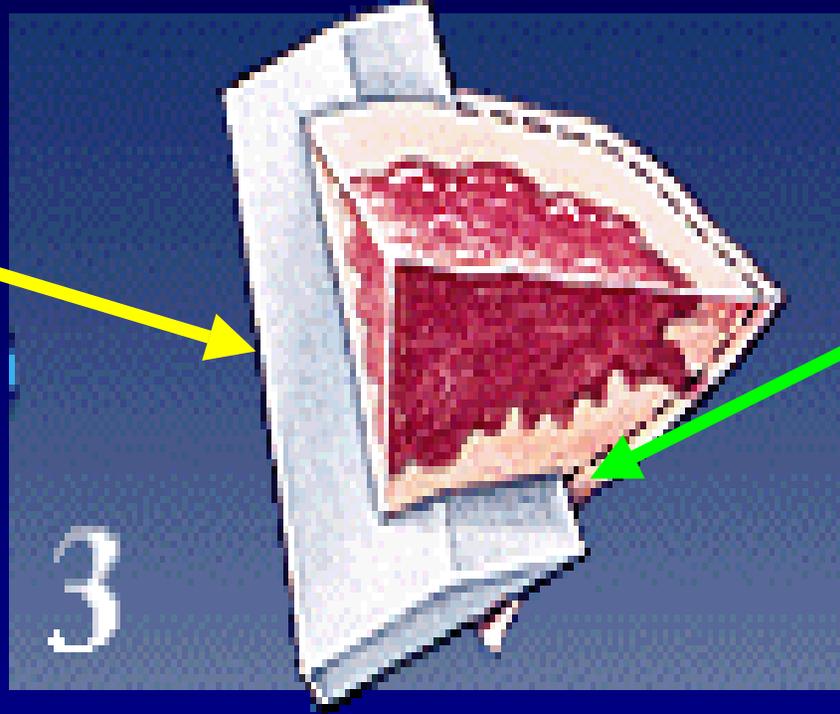
Mohs Micrographic Surgery Tissue Processing Details



The pie-shaped tissue is divided into pieces that are labeled, oriented, and color-coded. A corresponding map is created on paper. The pieces are placed into the cryostat (machine used to cut tissue sections) and frozen solid to facilitate easier slicing of the tissue sections.

Mohs Micrographic Surgery Tissue Processing Details

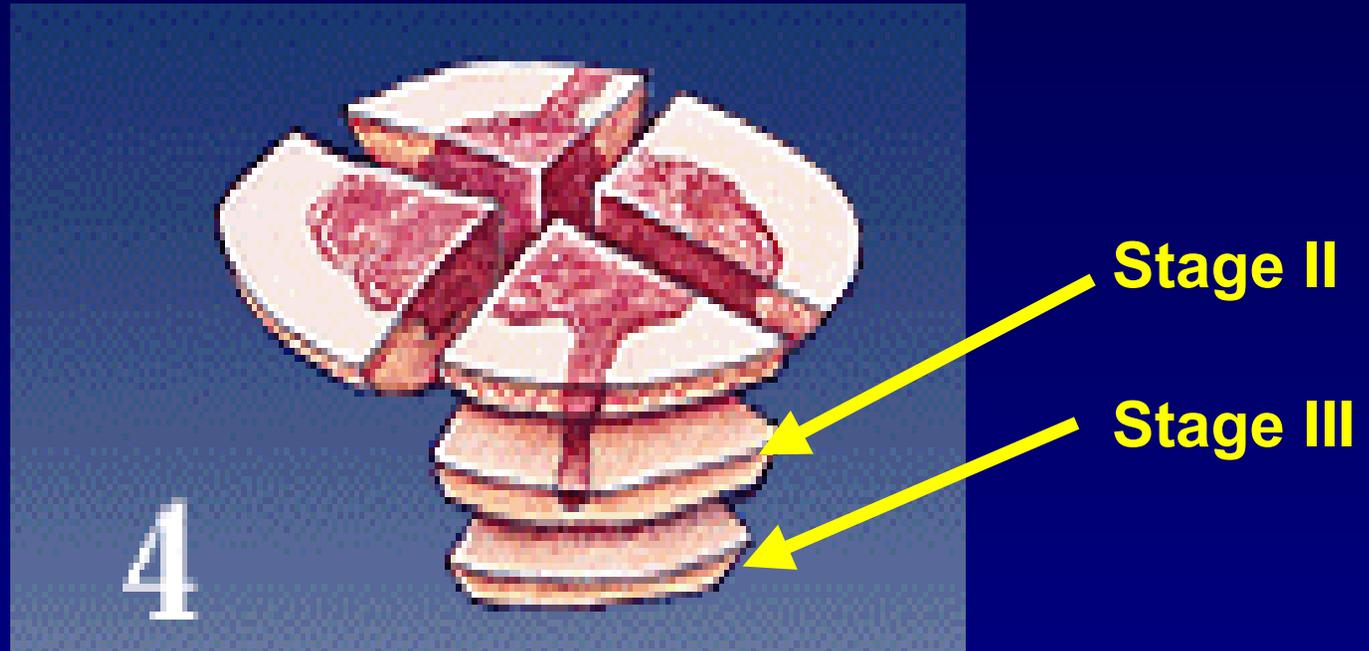
Cryostat
blade



Margin of
excision or
“crust of pie”
representing
100% of the
margin for
this piece of
tissue.

The frozen pieces of tissue are sliced in a manner that produces a slide section of tissue that corresponds exactly with the margin of excision or the “crust” of the pie. The center of the tissue is not examined.

Mohs Micrographic Surgery Tissue Processing Details



If tumor is noted on the pie crust or tissue margin, additional layers or stages will be taken from the patient that correspond with the positive area on the Mohs map until all of the tumor tentacles are removed. This minimizes the removal of normal skin due to the accuracy of the mapping technique.

In the following examples, we will examine the four most common ways that tissue excised in the standard technique is examined by a pathologist in a pathology lab. These four techniques apply to both frozen tissue (immediate result) and permanent tissue (delayed result).

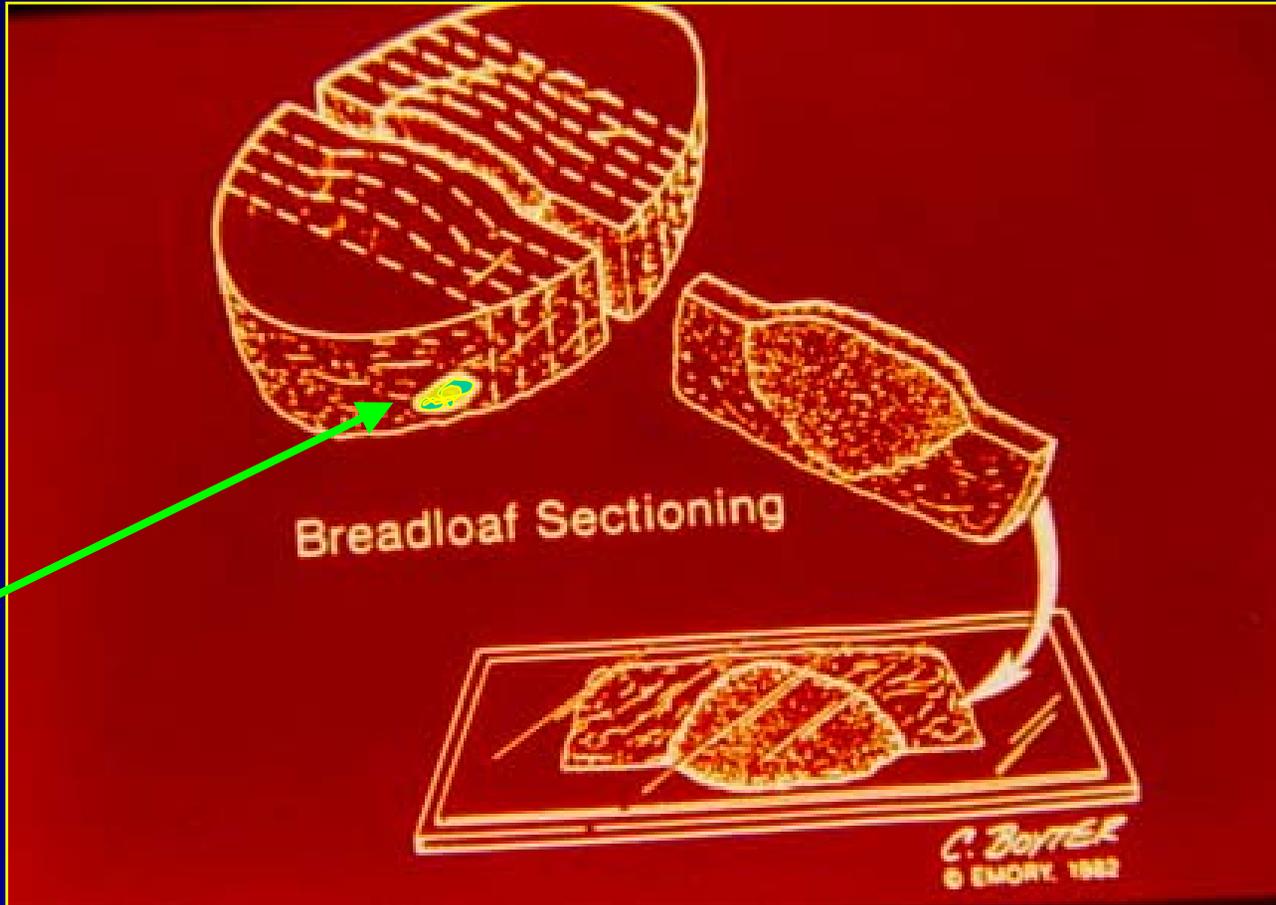
In each diagram, the yellow dot represents a tumor tentacle that extends to the edge or margin of the tissue. If this tentacle is not caught, the tumor will return within in a few years. In these examples, the yellow dot is placed in an area that would be missed the the standard examination techniques.

Since Mohs surgery examines the entire pie crust or 100% of the margin, these tentacles would not be missed.

The Four Standard Techniques for Histological Sectioning and Examination of Skin Lesion Excisions

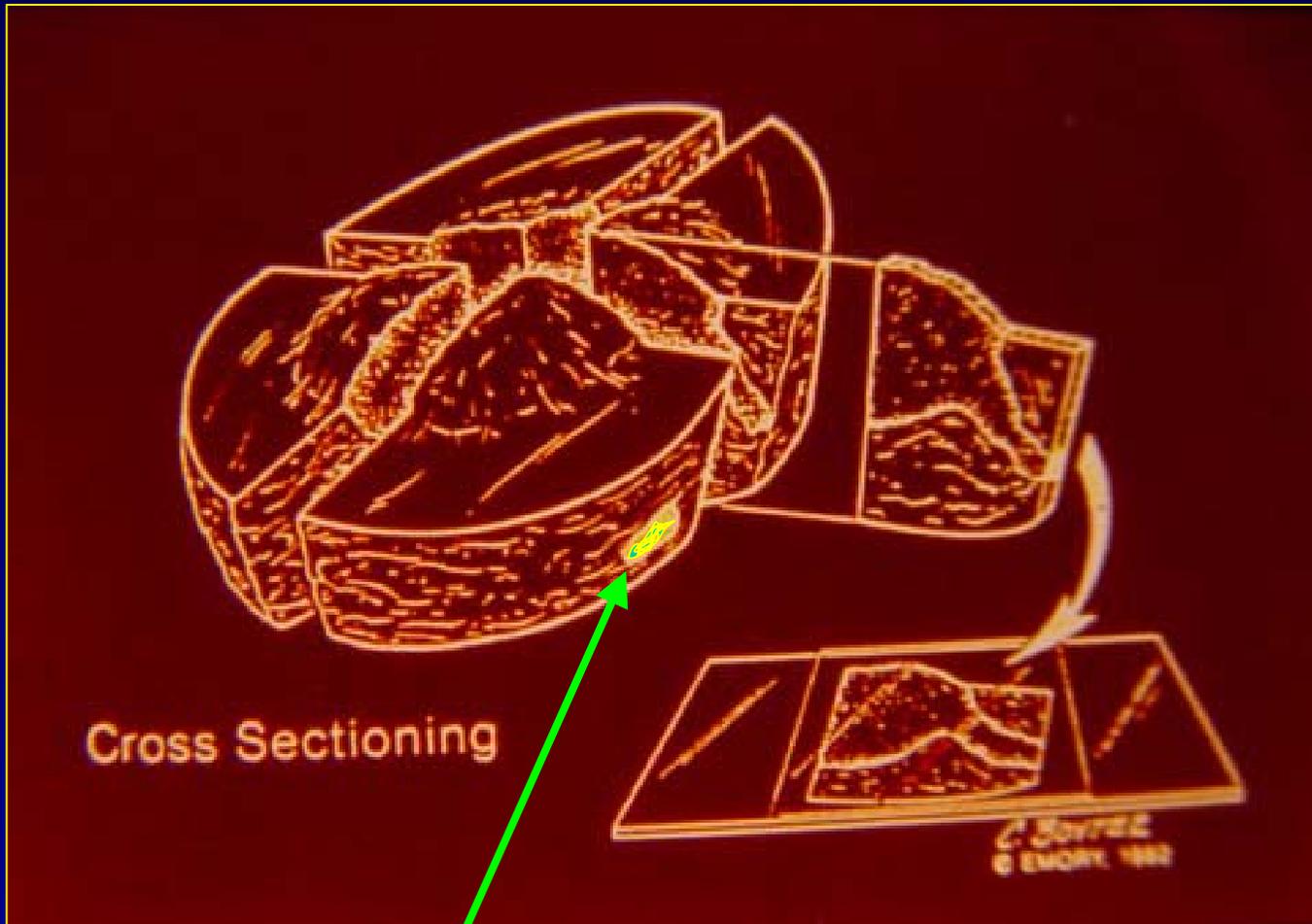
- 1. Breadloaf Sectioning**
- 2. Cross Sectioning**
- 3. Peripheral Sectioning**
- 4. Breadloaf and Cross Sectioning**

Breadloaf Sectioning (most common)



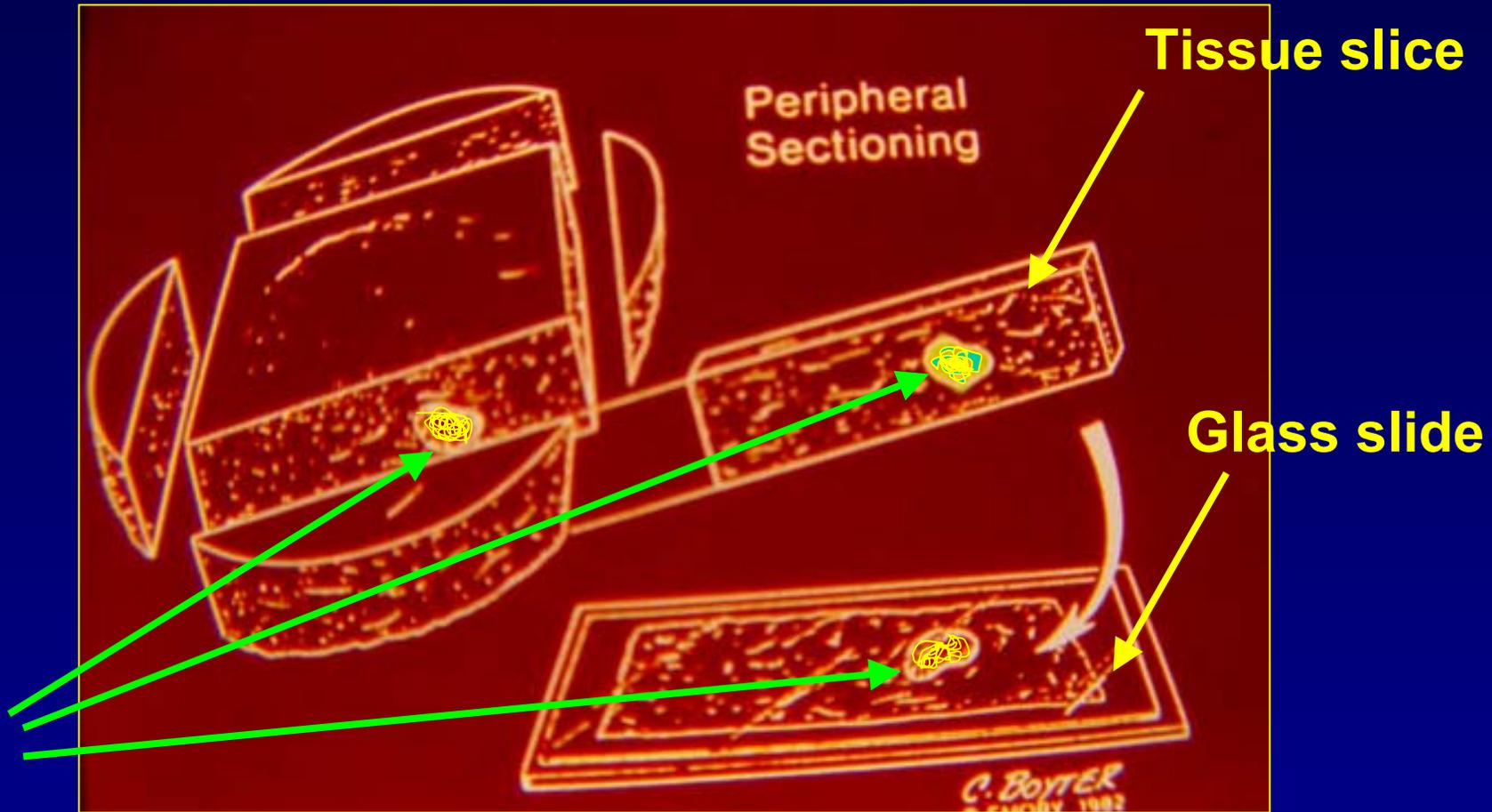
The tissue is sliced like a loaf of bread. The tentacle (yellow area) is missed so the tumor will not be cured.

Cross Sectioning Technique



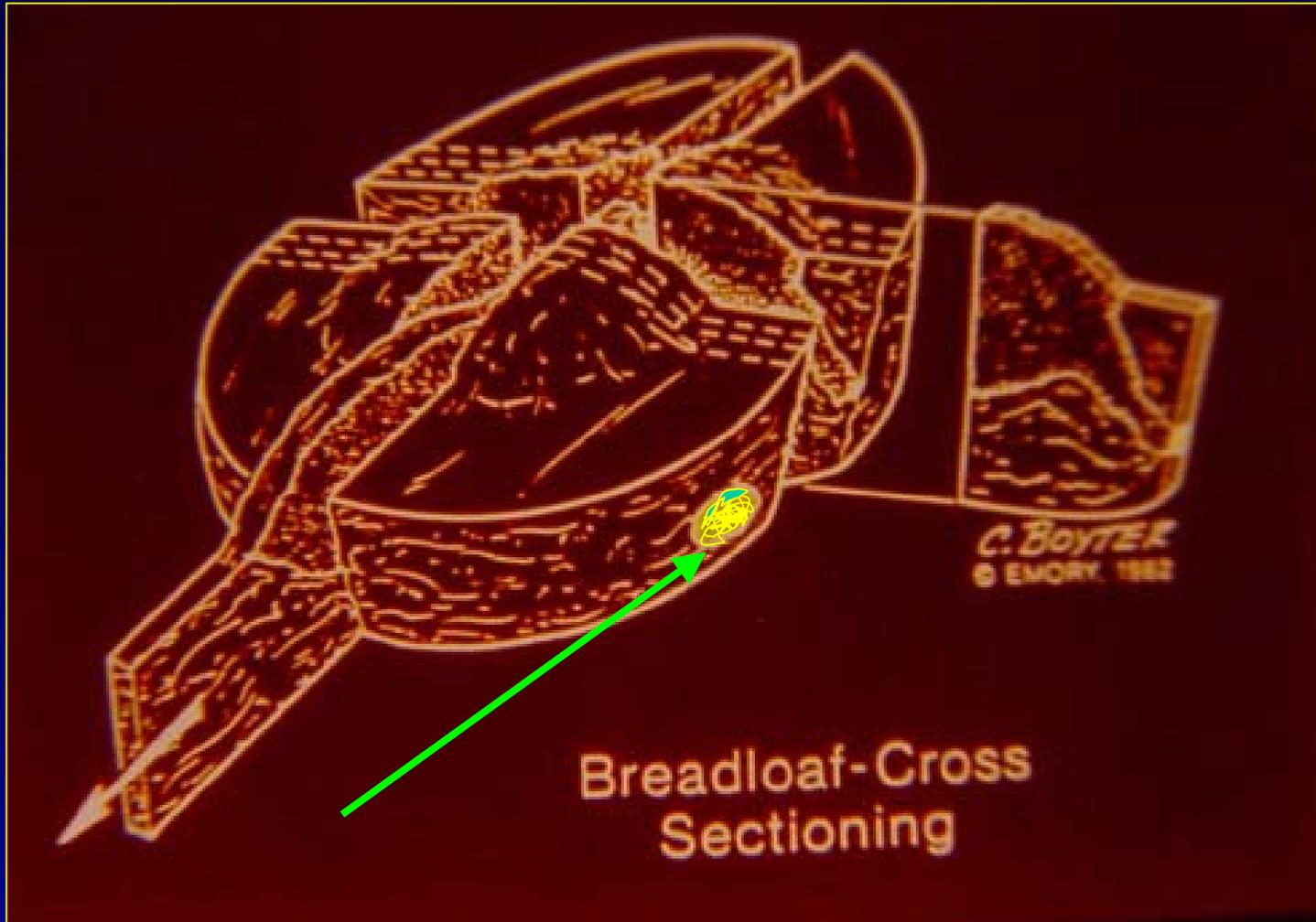
This technique also missed the tumor tentacle

Peripheral Sectioning Approach



This approach catches the tentacle. However, the entire bottom of the specimen beneath the tumor is not checked. The deep margin must be examined as well as the edges.

Breadloaf and Cross Sectioning Combination

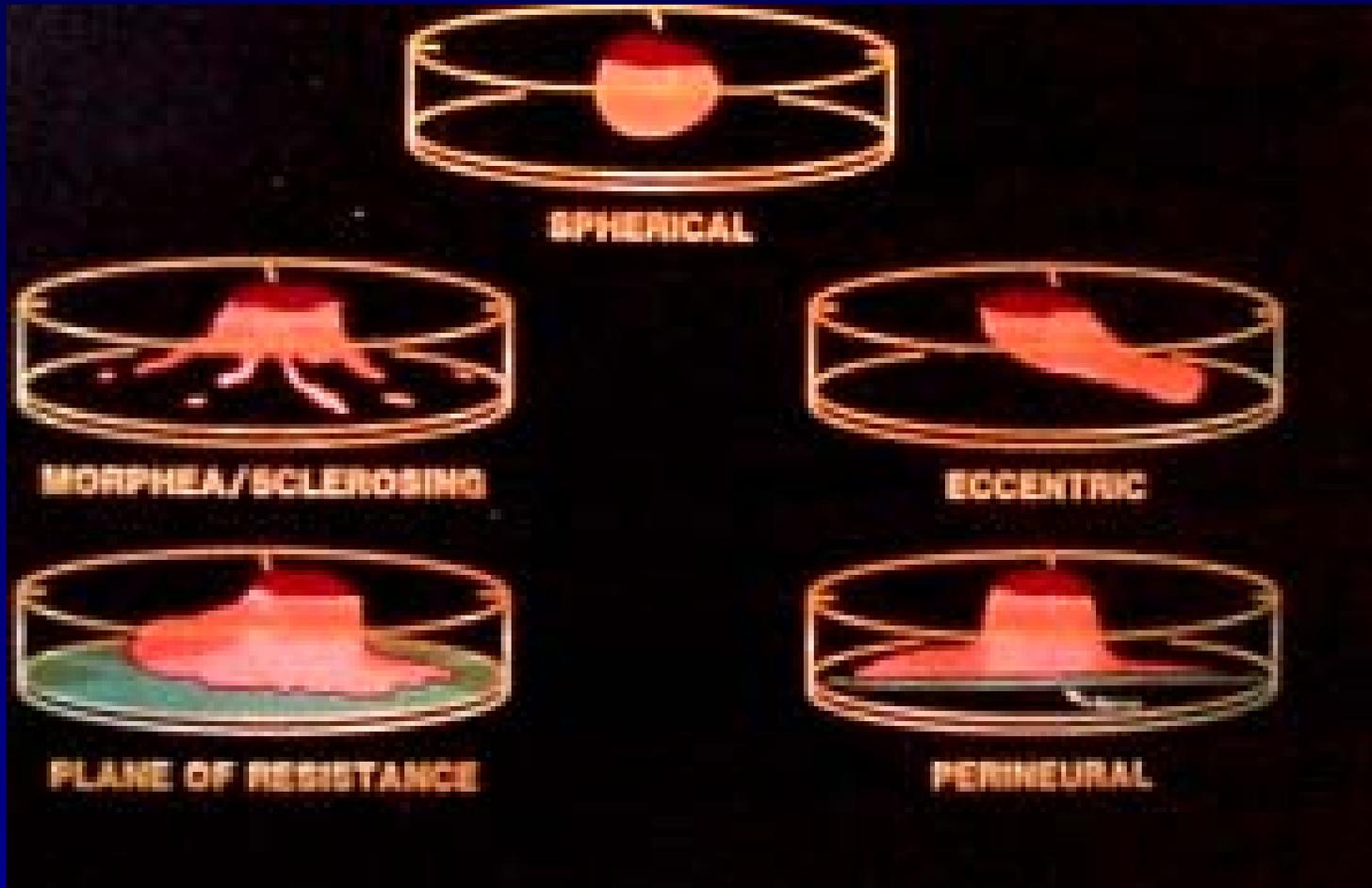


This combination technique also missed the tumor tentacle.

Limitations of Standard Permanent and Frozen Sections for Accurate Margin Control

- Less than **1%** of actual surgical margin is examined
(versus 100% of margin in Mohs surgery)
- Tumors do not grow in a predictable pattern
- Orientation of tissue less accurate than Mohs
- Slides read by a pathologist independent of surgery
- Limited interaction between surgeon and pathologist

Common Growth Patterns of Basal Cell Carcinoma



Skin cancers can grow in a variety of patterns that make them difficult to cure with standard excision

Standard Techniques for Tissue Sectioning and Examination of Skin Lesion Excisions are **Not Adequate Enough for Margin Control of Skin Cancers**

- 1. Breadloaf Sectioning**
- 2. Cross Sectioning**
- 3. Peripheral Sectioning**
- 4. Breadloaf and Cross Sectioning**

All examine less than 1% of the true surgical margin

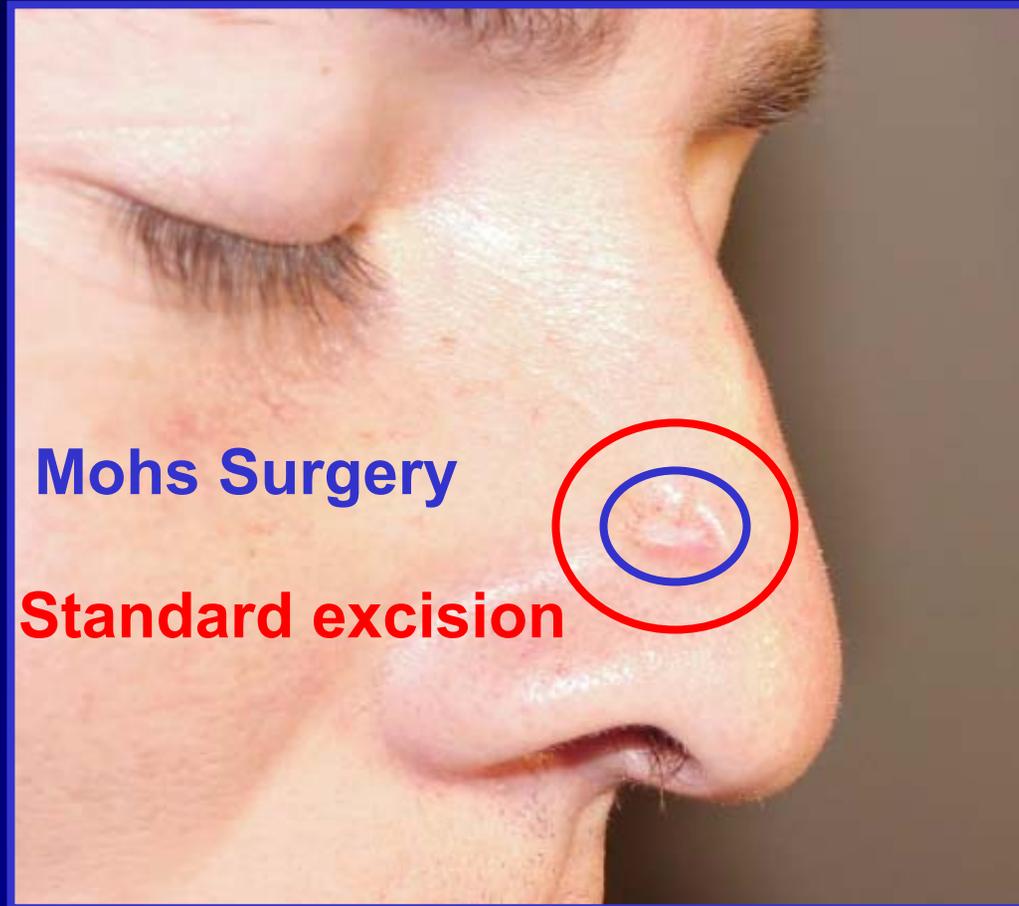
How much skin is removed during a Mohs Surgery versus standard excision for a skin cancer?

The first illustration depicts the removal of a basal cell carcinoma by Mohs Micrographic Surgery on the nose of a 30-year-old man.

The second illustration depicts the removal of the same skin cancer with the standard excision technique performed by other types of surgeons.

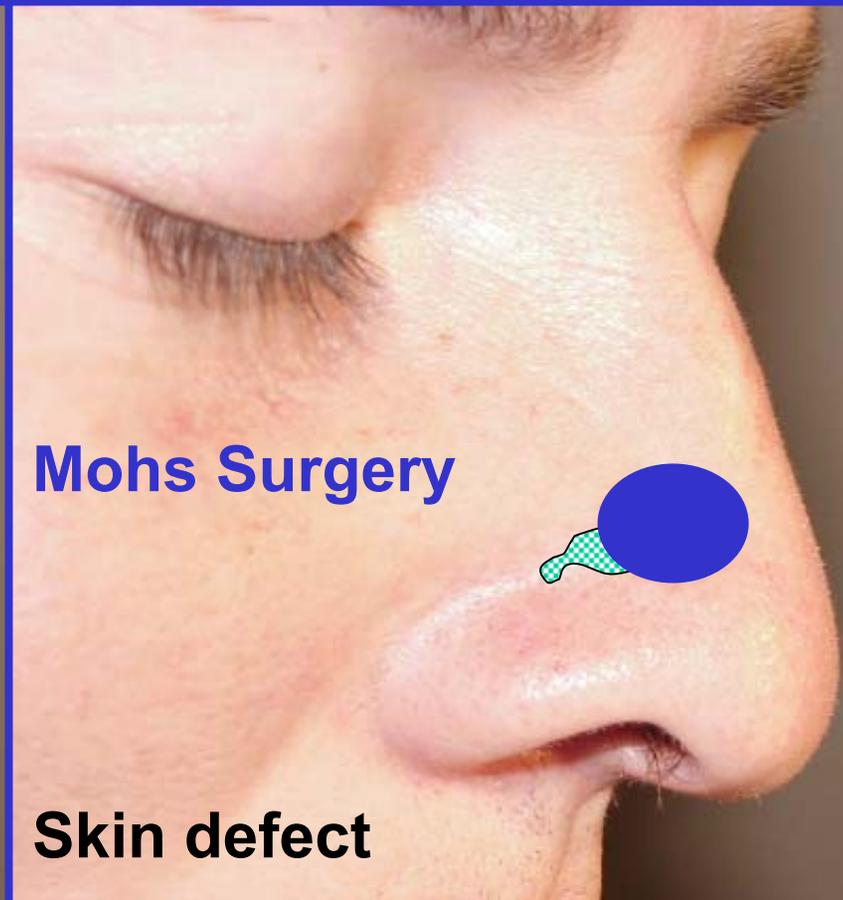
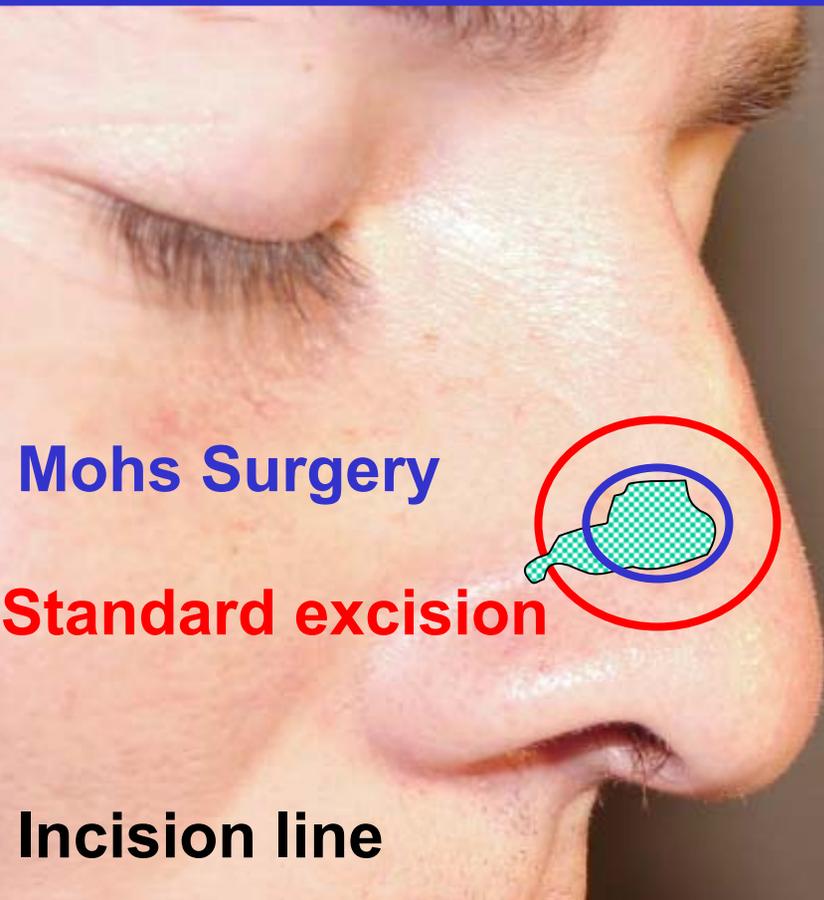
At the end of this presentation, I hope you understand that Mohs Micrographic Surgery has other advantages besides the highest cure rate. Mohs Surgery creates the smallest possible skin defect resulting in the smallest possible scar.

Mohs Micrographic Surgery vs. Standard Excision



The Mohs surgeon removes the skin cancer with a 1-2mm margin on the initial excision. **This contrasts with the non-Mohs surgeon whose initial standard excision includes a 5+mm margin of normal skin.**

Mohs Micrographic Surgery



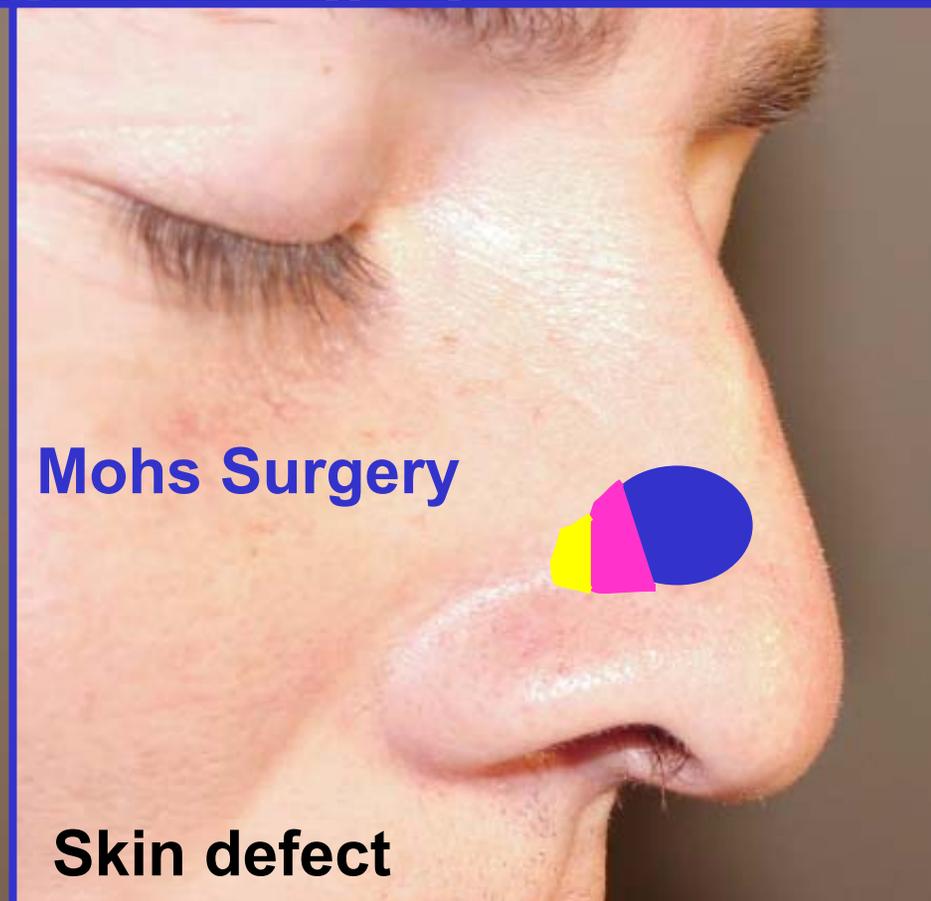
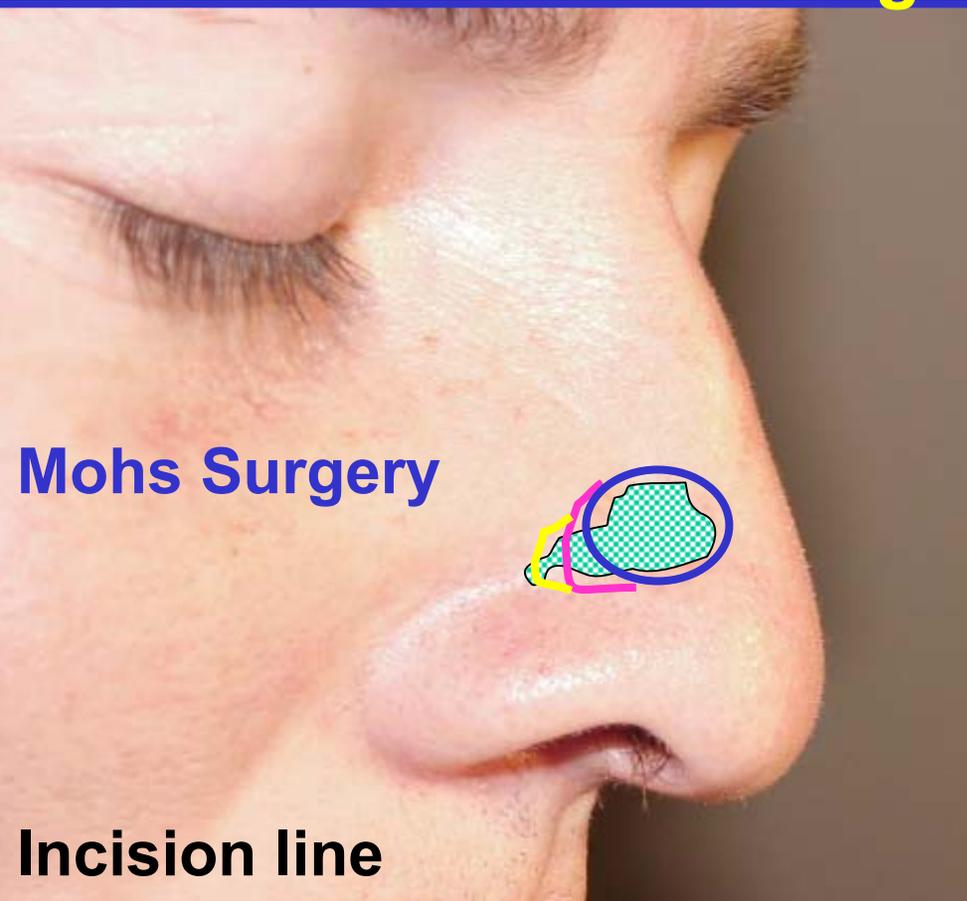
These photos depict the initial skin excision or Stage I of the Mohs surgery to remove the nasal skin cancer. The **actual tumor size is denoted above in green**. Mohs surgery, which studies 100% of the margin, will detect the exact location of residual tumor along the nostril at 8 to 9 o'clock

Mohs Micrographic Surgery



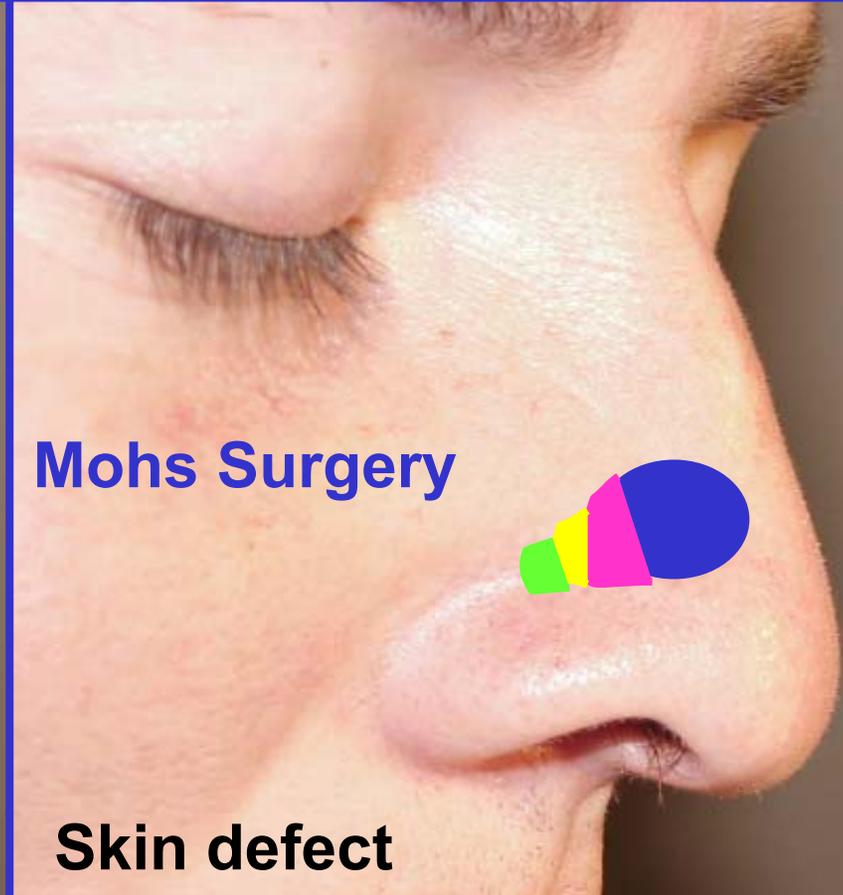
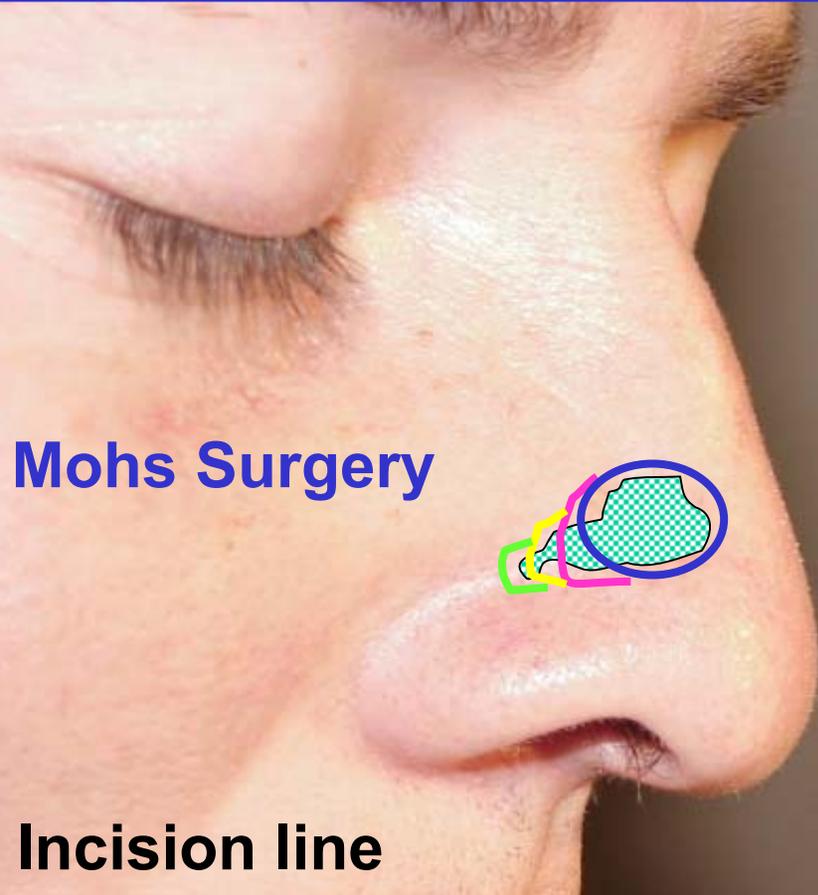
The patient returns from the waiting room for additional skin removal. The **second Mohs stage** consists of skin removed from the exact location of the residual tumor at 8 to 9 o'clock.

Mohs Micrographic Surgery



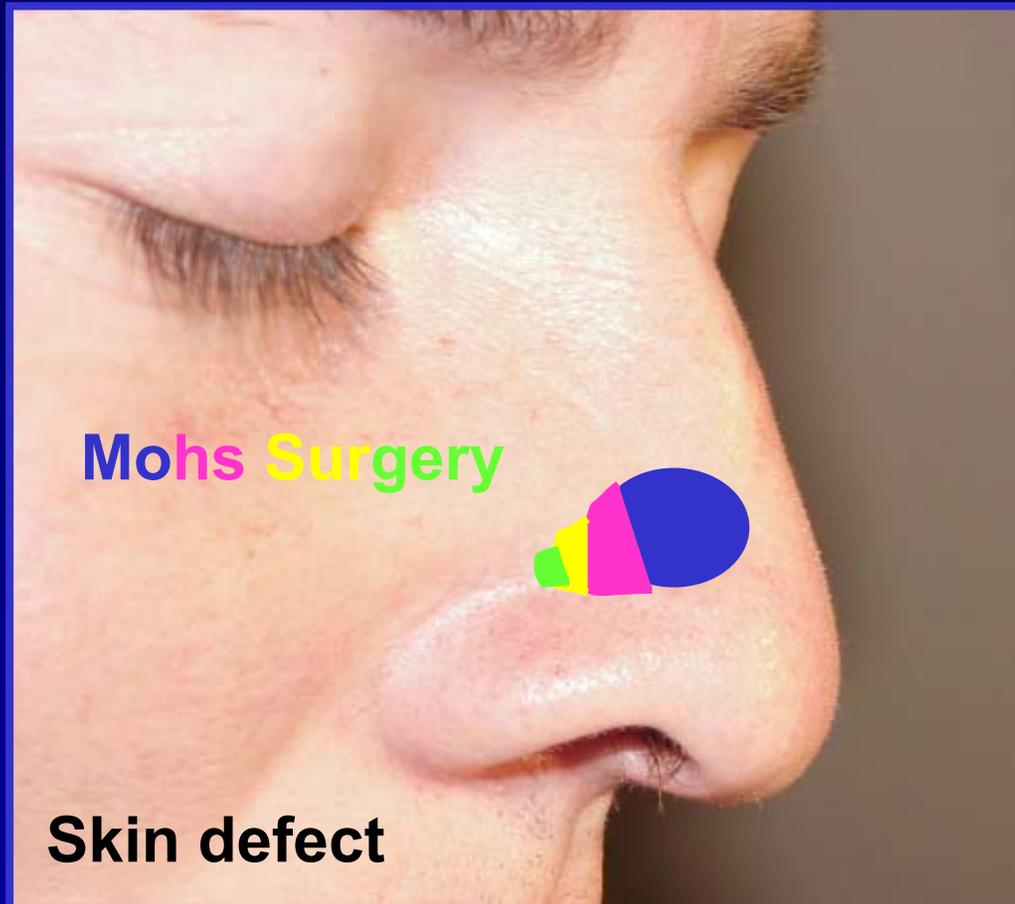
On microscopic examination of **Stage II**, tumor cells were still present. Therefore, the **third Mohs stage** removes additional skin from the same area.

Mohs Micrographic Surgery



Stage III also showed tumor and a **fourth Mohs stage** is needed to continue tracking out the tumor tentacle that appears to be tracking along the nostril. **Stage IV** was clear of tumor. Now the wound can be repaired with clean margins.

After four stages of Mohs surgery, this skin cancer was removed with the highest possible cure rate and minimal sacrifice of uninvolved or normal skin. This defect is as small as possible. This will allow for a reconstruction that provides the smallest possible scar.

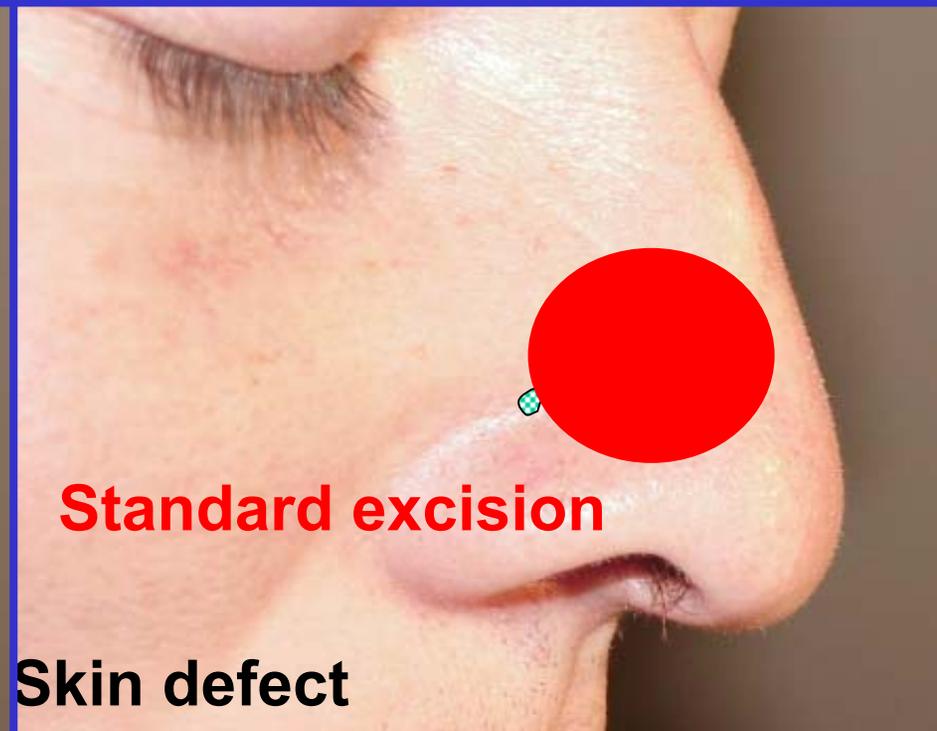
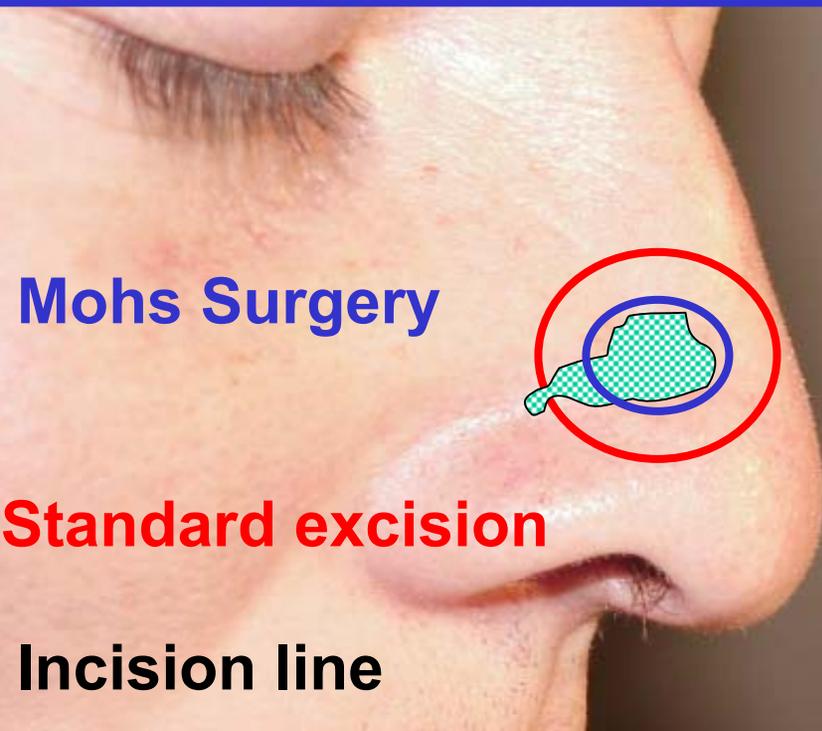


The following illustrations show the standard excision approach to the removal of the same nasal skin cancer.

This approach is presented from the hospital perspective where tissue can be examined in minutes and the office approach where pathology results are learned 2 to 7 days later (or 2 to 7 days after the wound was sewn up).

Remember that only 1% or less of the margin will be examined to determine if the tumor is removed.

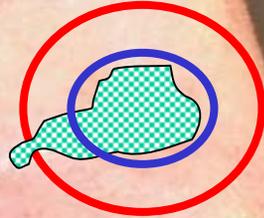
Standard Excision



The surgeon wants to remove the tissue on the first cut and will make large incision to ensure complete removal. Typically, a 5mm margin is taken as depicted in this illustration. As you can see, despite this large margin, a tentacle of tumor persists along the nostril. Hopefully, the pathology examination of **less than 1%** of the margin will catch the tentacle. If done in the hospital, a pathology examination can take place in minutes. If the tumor tentacle is missed in the exam, the wound will be stitched with tumor tentacle left behind. In a few months to years, the cancer will grow back.

Standard Excision—OFFICE PROCEDURE

Mohs Surgery

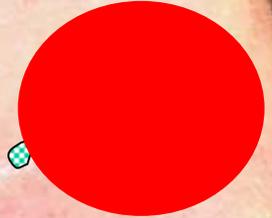


Standard excision

Incision line

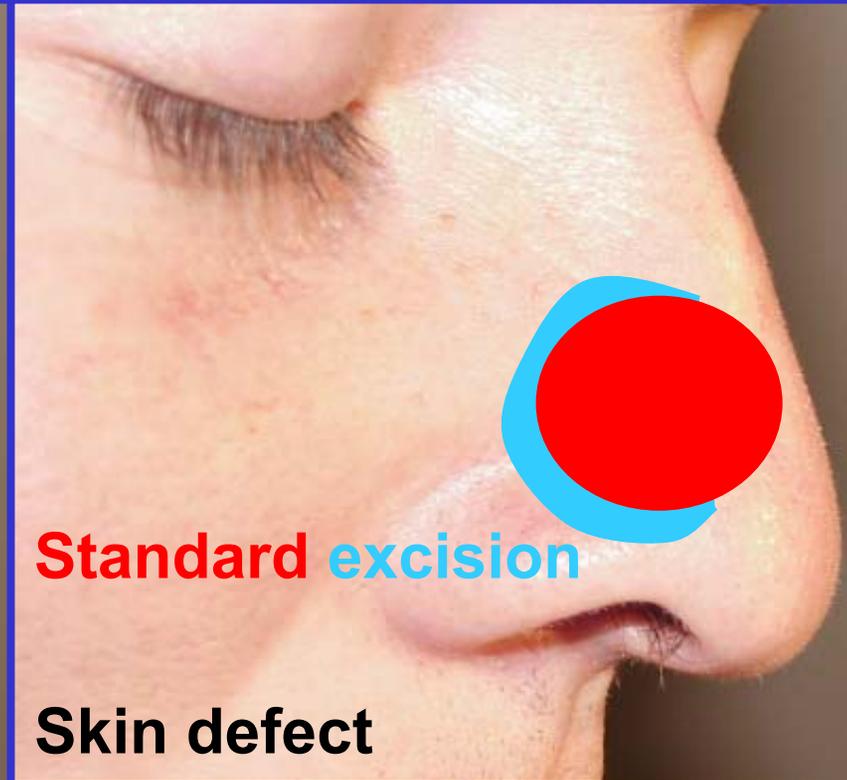
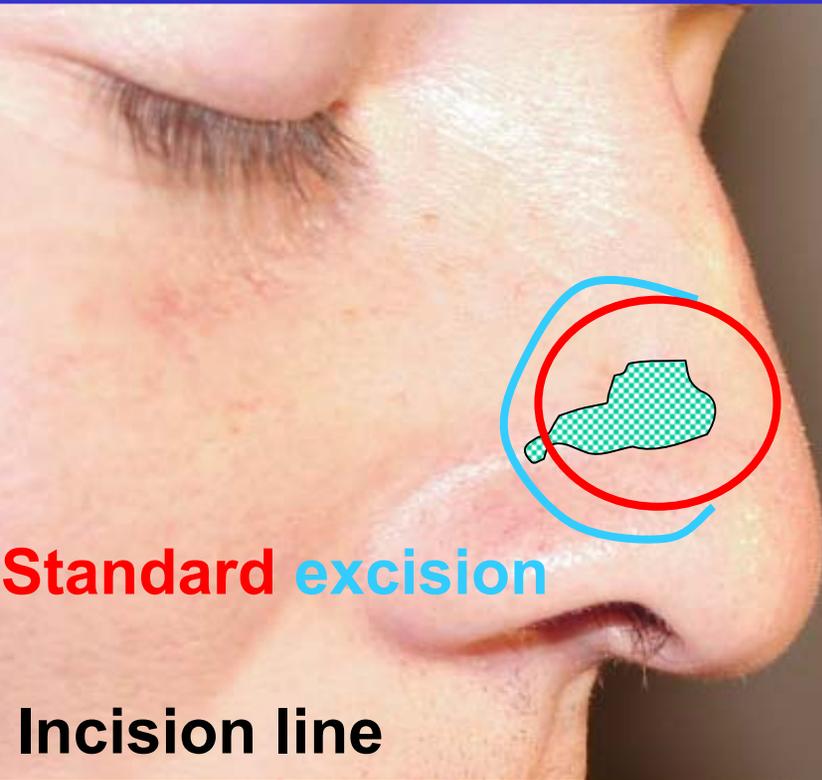
Standard excision

Skin defect



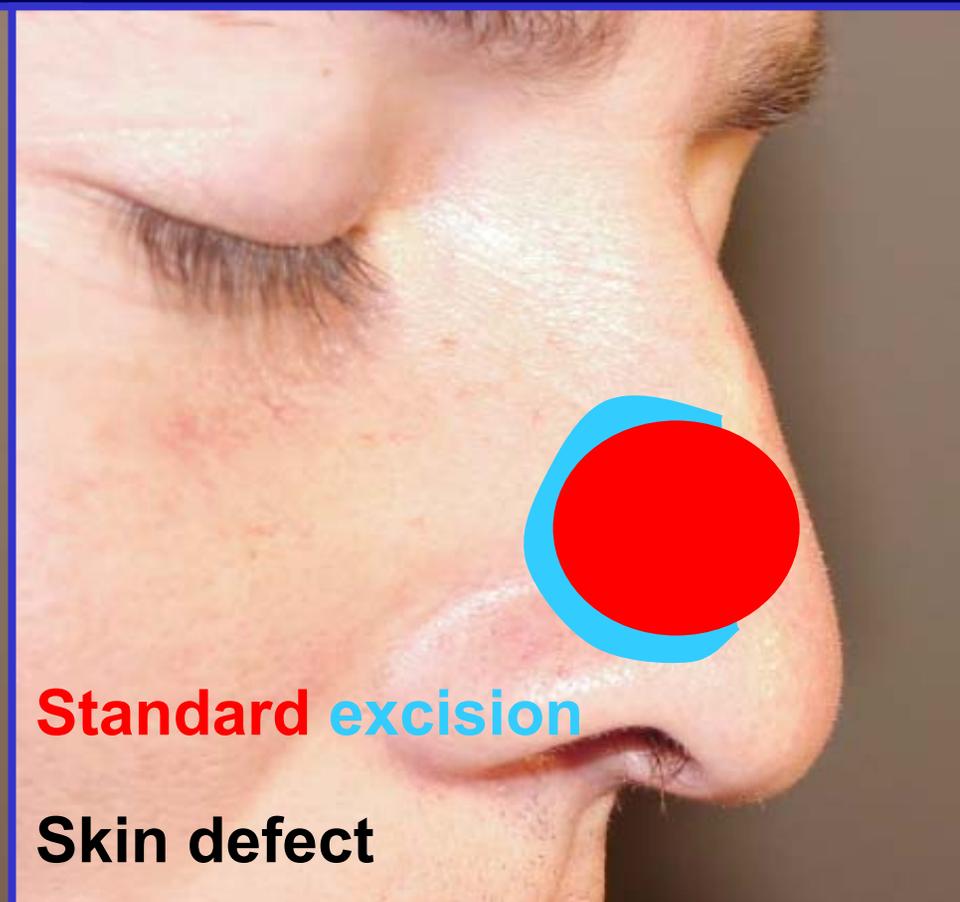
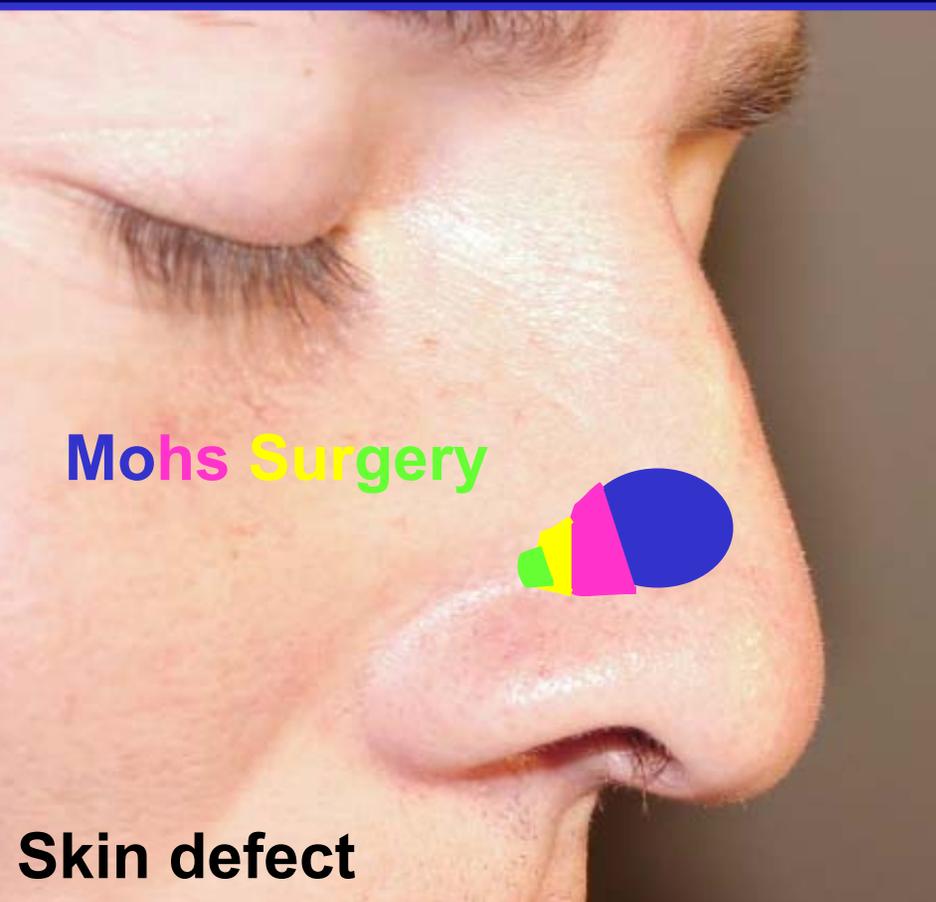
If this surgery is performed in the office with permanent section examination (results take 2 to 7 days) instead of frozen sections (results in minutes in the hospital), the doctor will begin to sew up the defect after the initial excision without knowing if the tumor has been removed. If the pathology examination catches the tentacle, the doctor will find out 2-7 days later and the surgery and stitching will have to be repeated. If the pathology technique misses the tentacle, the cancer will grow back.

Standard Excision—HOSPITAL PROCEDURE



If performed in the hospital, we hope the pathologist does find the residual tumor tentacle despite looking at less than 1% of the specimen. If so, he/she will communicate to the surgeon that tumor was observed on the margin at around 9 o'clock. In response, the surgeon will then remove an additional layer of skin noted (above in light blue) to cover the area from 6 to 12 o'clock to ensure that the tentacle is completely removed. This tissue will be examined again. If clear (which in this illustration it is), the pathologist will notify the surgeon to begin stitching the wound.

Mohs Micrographic Surgery vs. Standard Excision



Both Mohs surgery and standard excision cured this tumor, however Mohs surgery spared normal skin that did not need to be removed. Mohs surgery also creates clear margins with a 99% certainty. The smaller defect can be stitched much easier with a smaller scar.

**These illustrations have demonstrated
that:**

Mohs Micrographic Surgery tracks out the tumor by examining 100% of the margin and taking additional skin only in those exact areas showing residual tumor on the Mohs map.

Standard excision is a less precise excisional approach where less than 1% of the margin is examined, more normal skin is removed, and there is a lower cure rate since tumor tentacles can be left behind.

MOHS MICROGRAPHIC SURGERY is the superior technique because it:

- 1. Visualizes 100% of the surgical margin**
- 2. Provides a high cure rate of >99%**
- 3. Minimizes sacrifice of normal tissue**
- 4. Preserves function and cosmesis of area**
- 5. Performed with local anesthesia in the office**
- 6. Cost-effective**
- 7. Provides pathology results in minutes**
- 8. The same physician familiar with complicated skin tumors serves as surgeon, pathologist, and reconstructive surgeon**