

Confocal Microscopy

Patient information

What is confocal microscopy?

In vivo reflectance confocal microscopy (RCM or confocal microscopy) is a non-invasive type of imaging that allows your skin specialist to see a detailed, magnified view of your skin cells.

Confocal microscopy is used to investigate the first and second layer of skin to check for any abnormal or cancerous cells. It can be used to make a diagnosis of benign (non-cancerous) lesions and can triage lesions requiring biopsy. Confocal microscopy can also be used to help guide the treatment of melanoma and monitor a person's response to treatment.

Confocal microscopy differs to other imaging techniques, such as dermoscopy (a clinical examination that uses a polarised light and a 10x magnification). Confocal microscopy is a much more specialised technique, with very high magnification of individual skin cells.

How does it work?

Confocal microscopy is conducted using a handheld imaging microscope attached to a computer. A low power laser beam of light is used to magnify living cells in the skin by approximately 1000 times.

The technique gives your dermatologist a very detailed view of your skin cells – similar to what can be seen under a microscope in a laboratory, without the need to surgically remove a sample of skin for investigation.

Confocal microscopy does not always replace a biopsy. Some people may still need to undergo a biopsy following confocal microscopy.

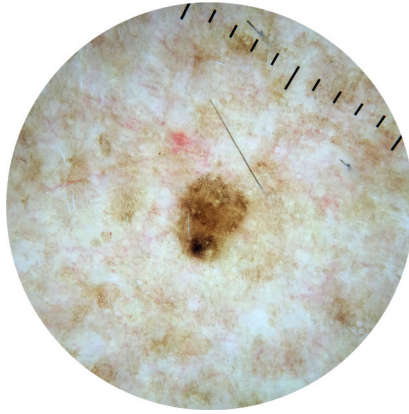


A patient undergoing confocal microscopy.

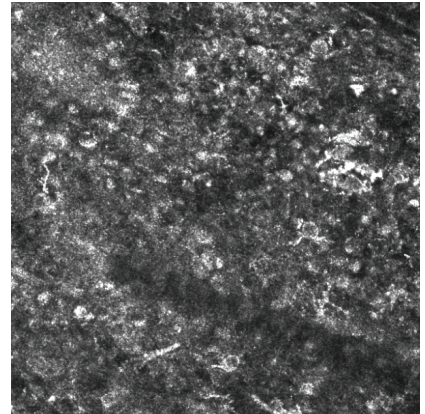
Melanoma



i. Clinical examination



ii. Dermoscopy

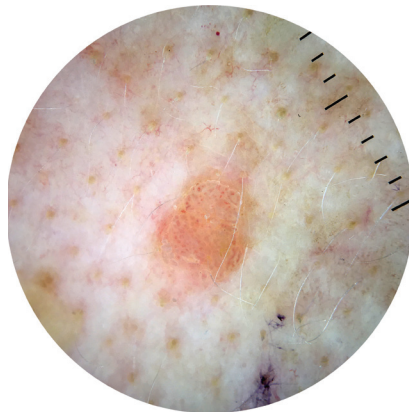


iii. Confocal microscopy

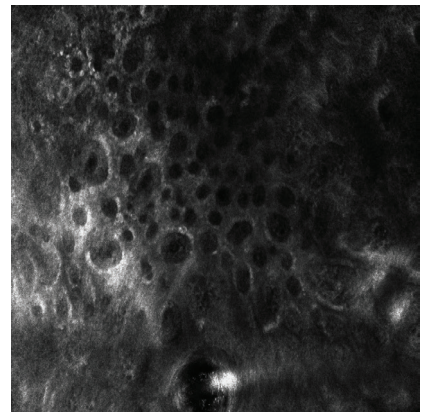
Seborrheic keratosis



i. Clinical examination

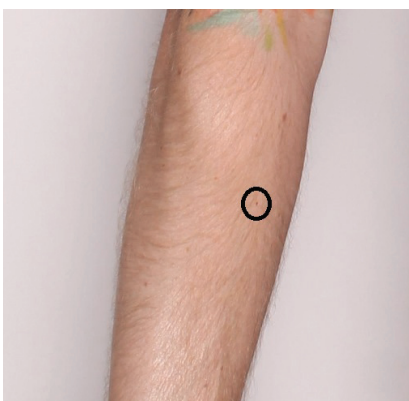


ii. Dermoscopy

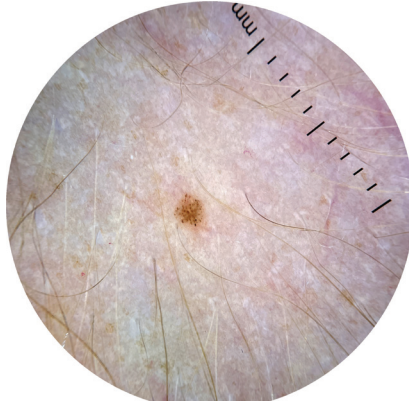


iii. Confocal microscopy

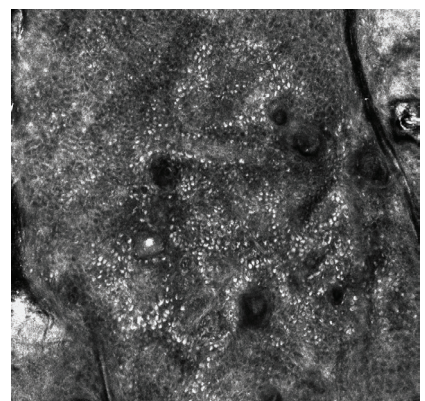
Benign mole



i. Clinical examination



ii. Dermoscopy



iii. Confocal microscopy

A comparison of what similar skin lesions look like on clinical examination, through a dermatoscope and through a confocal microscope.

Who can conduct confocal microscopy?

Confocal microscopy is a sub-specialty of dermatology. It requires at least 6 months of advanced fellowship training, and detailed knowledge of the structure and composition of the skin (dermatopathology) for a skin specialist to become appropriately trained to conduct and interpret confocal microscopy.

What are the benefits of confocal microscopy?

Confocal microscopy is the most accurate non-invasive test for diagnosing melanoma. Studies show that confocal microscopy has a sensitivity of 92% for melanoma. This means it will accurately diagnose a melanoma 92% of the time.

Confocal microscopy can also accurately diagnose benign lesions, in particular benign sun and age-related lesions.

This accuracy means that confocal microscopy can spare patients with benign lesions from unnecessary biopsies. Due to the clarity and detail in confocal microscopy images, dermatologists can confidently tell the difference between melanoma and benign lesions. This means patients with benign moles can avoid unnecessary surgical complications, such as pain and scarring. Studies show that confocal microscopy reduces unnecessary biopsies by 43% compared to clinical assessment with dermoscopy.

Avoiding unnecessary biopsies also has a cost benefit, to both the patient and the healthcare system.

When a surgical biopsy is needed, confocal microscopy can be used to guide which part of the lesion to biopsy, helping to guide the pathologist to examine precisely the atypical area and therefore, more likely to achieve an accurate diagnosis.

Before surgery, confocal microscopy is sometimes used to map the extent of a melanoma. This can help to define the 'margin' or border of a melanoma, so that your dermatologist or surgeon can be sure they are removing all of the suspicious tissue during surgery. This is especially helpful for subtypes of melanoma (especially lentigo maligna) with a poorly defined border or for lesions on the face.

Confocal microscopy can also be used to monitor how well a non-surgical treatment is working (such as imiquimod cream or radiotherapy) and confirm complete response to treatment or identify recurrence or progression early.



An example of a hand-held confocal microscope.

Who can benefit from confocal microscopy?

Confocal microscopy is a safe and painless technique that is suitable for most people, including children and pregnant women.

Your dermatologist will identify the lesions that could benefit from confocal microscopy during a clinical examination or dermoscopy session.

As confocal microscopy only penetrates the first few layers of the skin (about 0.2–0.3mm), it is not suitable to investigate all types of skin lesions. For example, confocal microscopy is not suitable for:

- thick, ulcerated or scaly skin lesions
- conditions of the nail
- lesions on the palm of the hand or sole of the foot
- lesions which are located deep inside or under the skin (e.g. subcutaneous lesions).

If you have undergone surgery or have used a topical treatment for melanoma, you may be advised to wait 3 months before undergoing confocal microscopy.

Confocal microscopy can be particularly helpful when there is some uncertainty about a lesion and your dermatologist needs further information. However, it is not usually required when there is no doubt about the diagnosis or when a biopsy is clearly necessary.

What should I know about undergoing confocal microscopy?

Confocal microscopy is a painless and non-invasive procedure which takes between 15 and 30 minutes.

You will be required to sit or lie still in a darkened room while the images are taken.

The skin lesion is cleaned, hair may be removed and small amount of gel will be applied to the skin.

Depending on the type of microscope being used, your skin specialist will either:

- manoeuvre a handheld device over the lesion to capture an image, or
- clip the microscope to your skin using an adhesive ring and capture the image.

In most cases, your dermatologist will discuss the results of your imaging with you during your appointment, but sometimes the images will be reported after the appointment.

It is recommended that you wear comfortable, loose-fitting clothes to the procedure so that you are easily able to expose the area of skin under investigation.

How much does confocal microscopy cost?

Confocal microscopy is a highly specialised technique, which is currently only available in a small number of major specialist centres in Australia.

While confocal microscopy is a cost-effective method for reducing unnecessary biopsies, it is not covered by Medicare. It may be covered by the Department of Veterans Affairs and some private health insurers.

Preparing for confocal microscopy

Certain factors can make conducting and analysing confocal microscopy more difficult.

- ✗ Do not have confocal microscopy if your skin is sunburnt or the area of your skin being examined is bruised.
- ✗ Do not use fake tan for 2–4 weeks before your procedure.
- ✗ Avoid applying make-up or cream to your skin on the day of your procedure.

Further reading

You may like to read our other patient information brochures on [melanoma.org.au](https://www.melanoma.org.au):

- Total Body Photography
- Lentigo Maligna

Please note: The information in this brochure is of a general nature and should not replace the advice of healthcare professionals. All care has been taken to ensure the information presented here is accurate at the time of publishing (October 2022).