

Clinical imaging with an iPhone

Hon A/Prof Amanda Oakley

Waikato Hospital, 25 June 2015



This presentation

- Why take clinical images?
- Patient consent
- Smartphone cameras
- Best practice
- Anatomic views
- Close-up photography
- Dermatoscopy
- Some helpful apps

Why take clinical images?

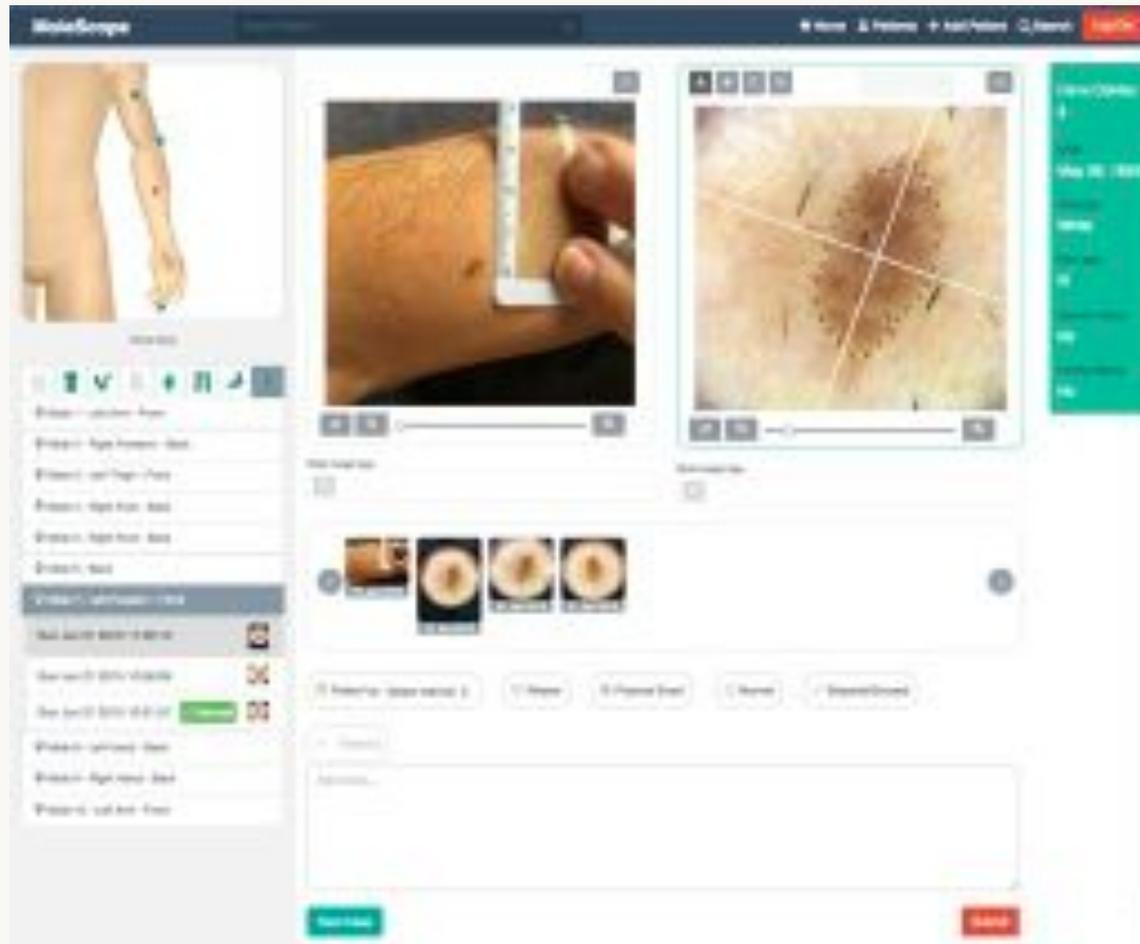
- Documentation
- Compare clinical status at follow-up
- Referral to dermatologist
- Histopathology request
- Multidisciplinary review
- Personal education
- Teaching
- Publication

Documentation



Samsung Galaxy S4, September 2014

Follow-up



Referral to dermatologist

The old way



The new way

Date: 25-Jul-2014 23:02:25 Message no 1007
From: Dr Amanda Oakley
Message Subject: Response - to: Dr Giles Turner
Text: I agree. This is melanoma. I will excise with 2mm margin to determine thickness. The pathologist's attention might be drawn to areas of differing dermopathy, especially where there is blue colour as this often denotes a deeper component.

Date: 25-Jul-2014 21:44:22 Message no 1006
From: Mrs Aislyn Carr
Message Subject: Allocation - to: Dr Amanda Oakley
Text: Dear Amanda,

Would you please give your expert opinion to Dr Turner regarding this case.

Mary, Thanks,
Aislyn

Date: 25-Jul-2014 10:40:21 Message no 1005
From: Dr Giles Turner
Message Subject: New referral - patient L760712
Text: Lesion noticed on left anterior shin mid shin. Blue appearance with irregular border, hyperpigmented areas and dark spots. ? melanoma

Gordon Jones



Histopathology request



Multidisciplinary meeting



Teaching



Patient consent

Photographic Consent Form

Section 1: Patient Information

Name	
Address	
Phone	
Age	
Sex	
Signature	

Section 2: Consent

I, the undersigned, do hereby consent to the taking of photographs of my person for the purpose of the following:

General Photography and Video Recording

Special Photography and Video Recording

Section 3: Body Diagrams

Section 4: Signature

Signature: _____

Date: _____

Section 1: Patient Information

Name	
Address	
Phone	
Age	
Sex	
Signature	

Section 2: Consent

I, the undersigned, do hereby consent to the taking of photographs of my person for the purpose of the following:

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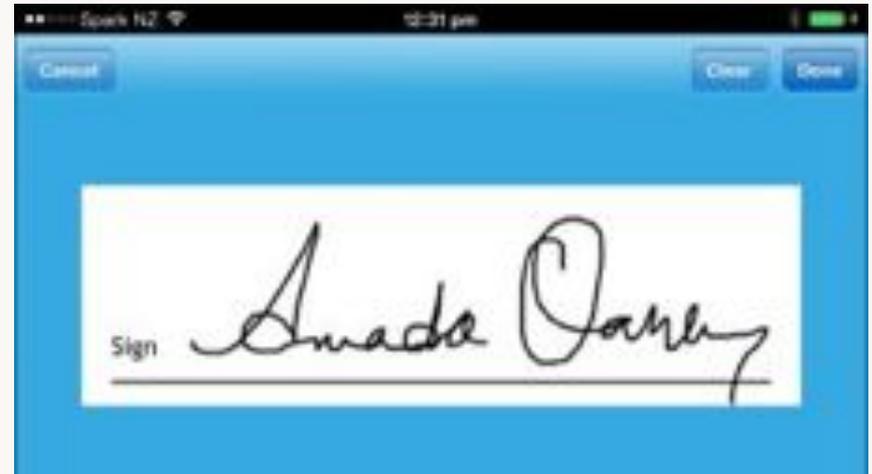
Date: _____

Consent on iPhone

PicSafe Medi



Consent



Smartphone cameras

- Always with you
- High quality in top end models
- Sensors work in low light
- Easy to archive / back up
- Easy to email / message / upload to website

iPhone 6 or iPhone 6+



iPhone 6+ or iPhone Touch

8 MP iSight camera

5.5" 1920-by-1080-pixel resolution at 401 ppi



5 MP iSight camera

4" 1920-by-1080-pixel resolution at 401 ppi



Samsung Galaxy 6



- 16 MP
- Works well in low light
- HDR removes shadows and highlights
- 5.1" display

Other Androids



- HTC One M9 20 MP
- Sony Xperia Z3 20.7MB

Best practice

- Privacy + security
- Back up
- Removing image from the phone
- Quality images

Privacy

- Check privacy settings
- Avoid full-face images where possible
- Remove jewellery and clothing
- Tattoos are identifying

Security

- Lock your screen
- TouchID is best
- Use 8⁺-character memorable passcodes
eg il2tlk2U!

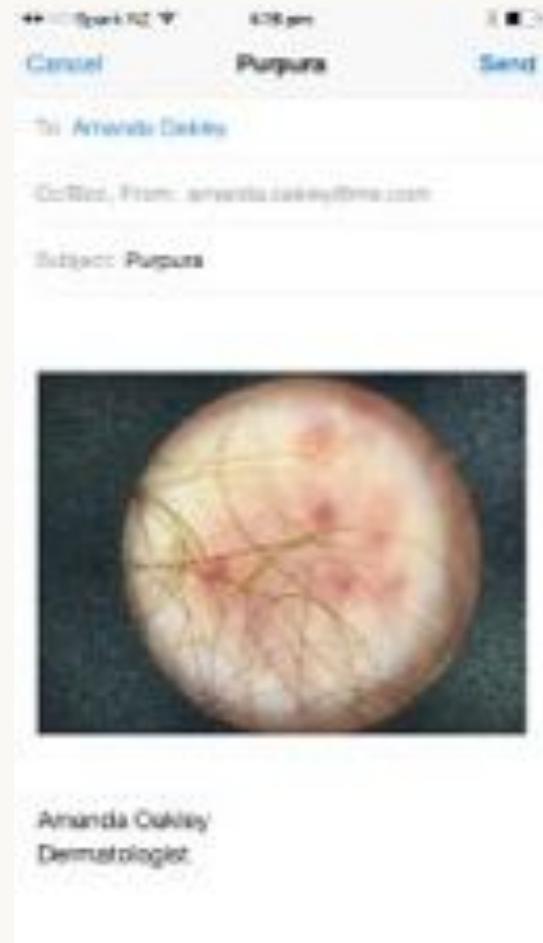


Automatic encrypted backup

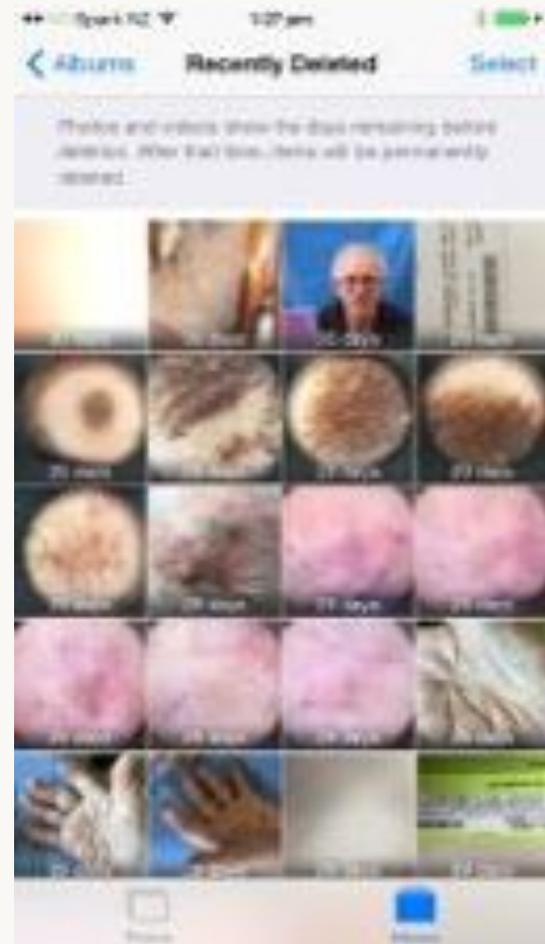
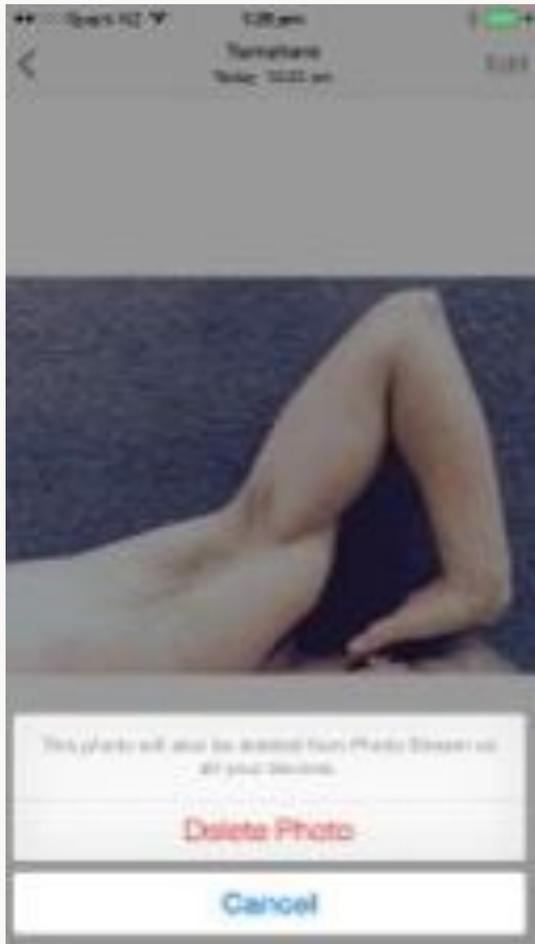
- iCloud Drive
 - Or, via iTunes when connected
- My Photo Stream
- Dropbox



Sharing the picture



Remove image from the phone



Picsafe Medi removes it for you

Email report



Online report

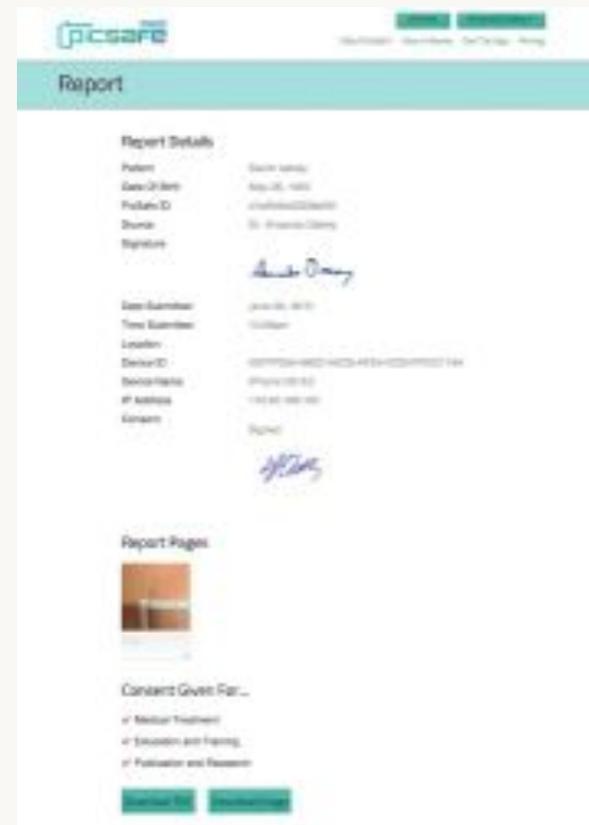


Image quality

- Ensure plenty of light
- Check exposure is adequate
- Suitable background
- Avoid extraneous objects
- Ensure focus
- Lens parallel with subject

Under-exposed

- Avoid side lighting
- Use flash if necessary (force flash)



Apple iPhone 3GS, August 2011

Shadows rarely help diagnosis



Apple iPhone 4S, November 2014



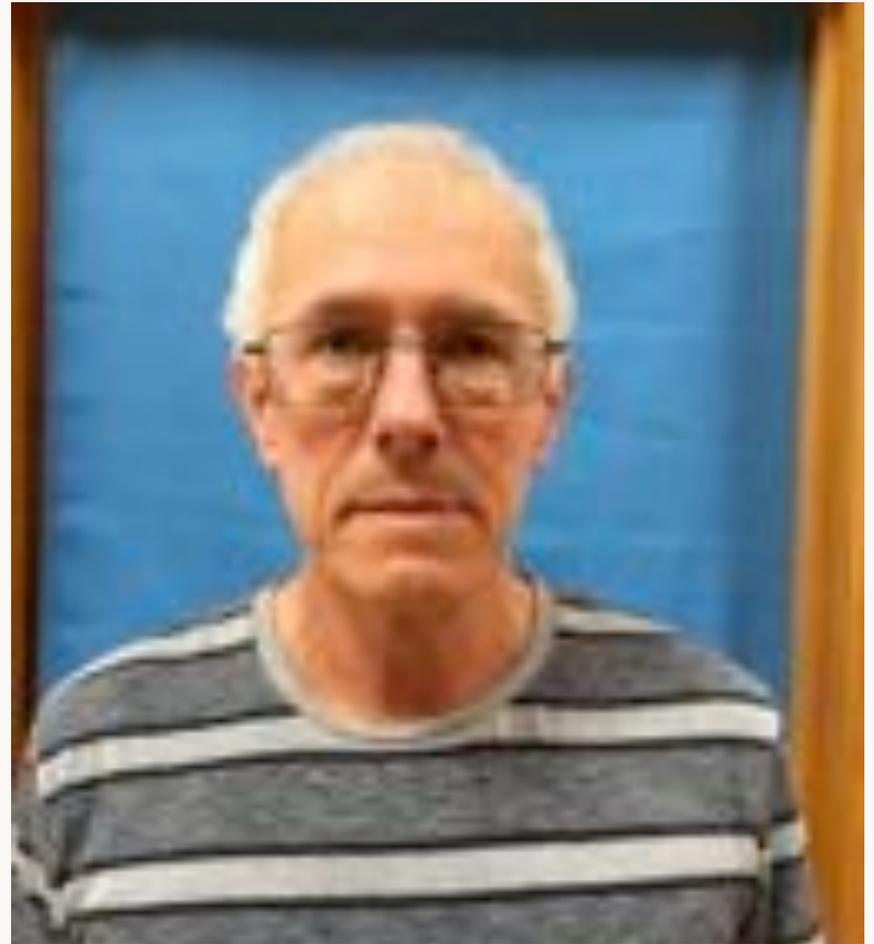
Apple iPhone 3GS, August 2011

Tap & drag to adjust exposure



Use a plain matte background

- Neutral blue, green, grey
- Cloth, paper, wall, photographic backdrop



Avoid a busy background



HTC_PO582, April 2015

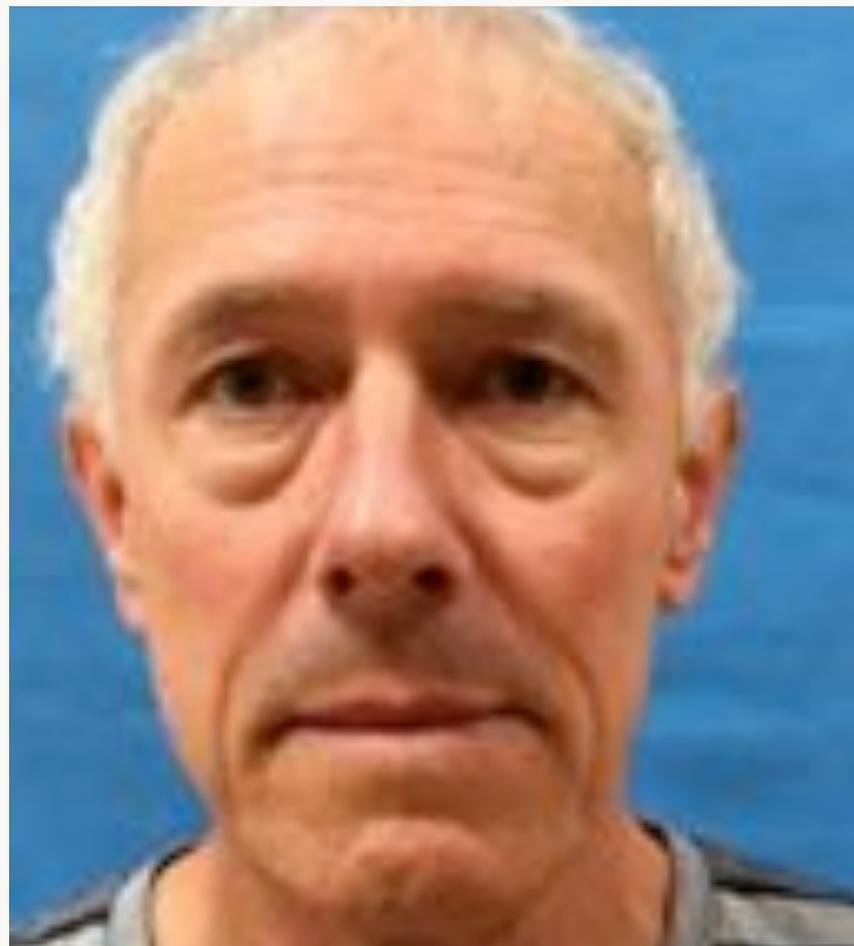


HTC_PO582, April 2015

Avoid extraneous objects

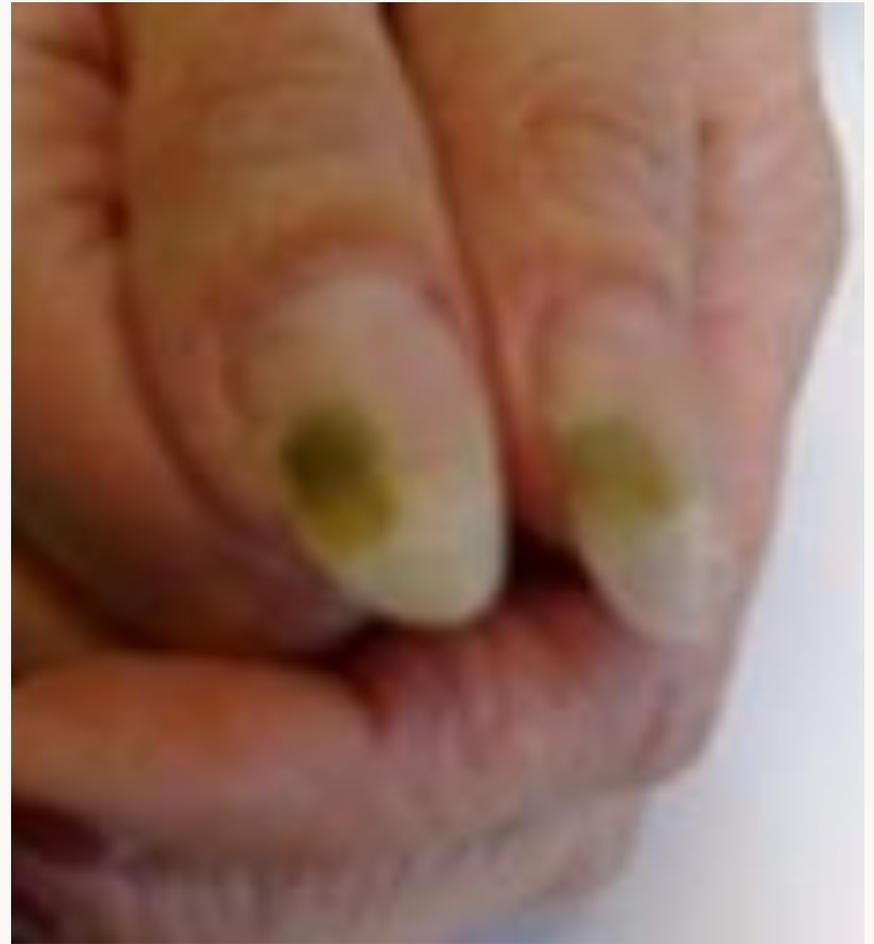


Avoid extraneous objects



Ensure focus

- Lens parallel with subject
- Don't get too close
- Tap screen to guide the camera to focus point



Nokia N95, November 2008

Lens not parallel with subject

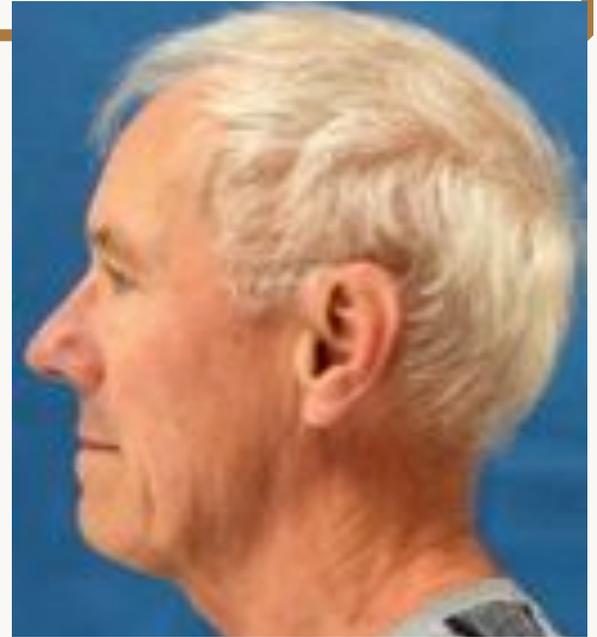
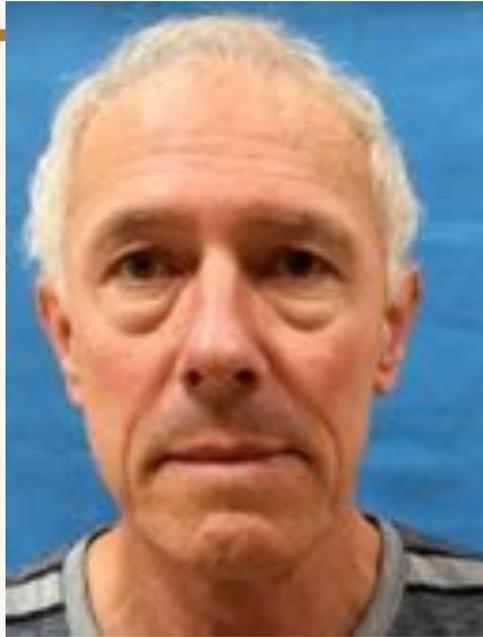


Samsung Galaxy S4, January 2015

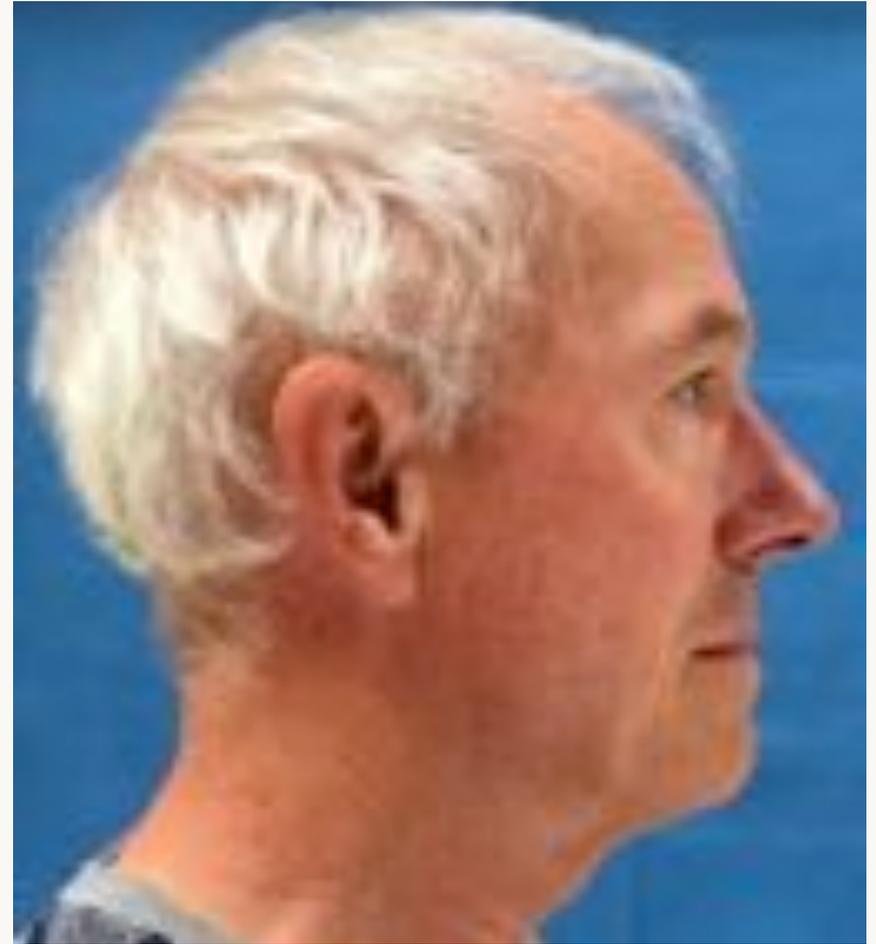


Sony Ericsson K800i, April 2009

Head and neck



Minimising shadows



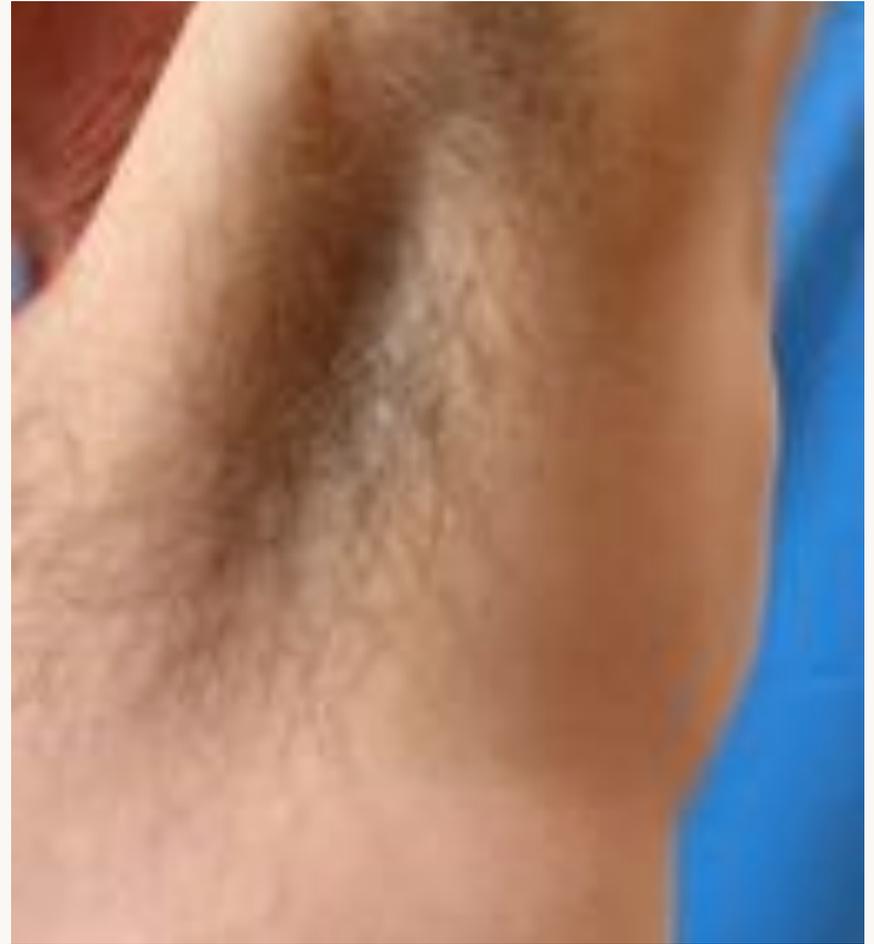
Use a reflector to get rid of shadow



Trunk



Trunk



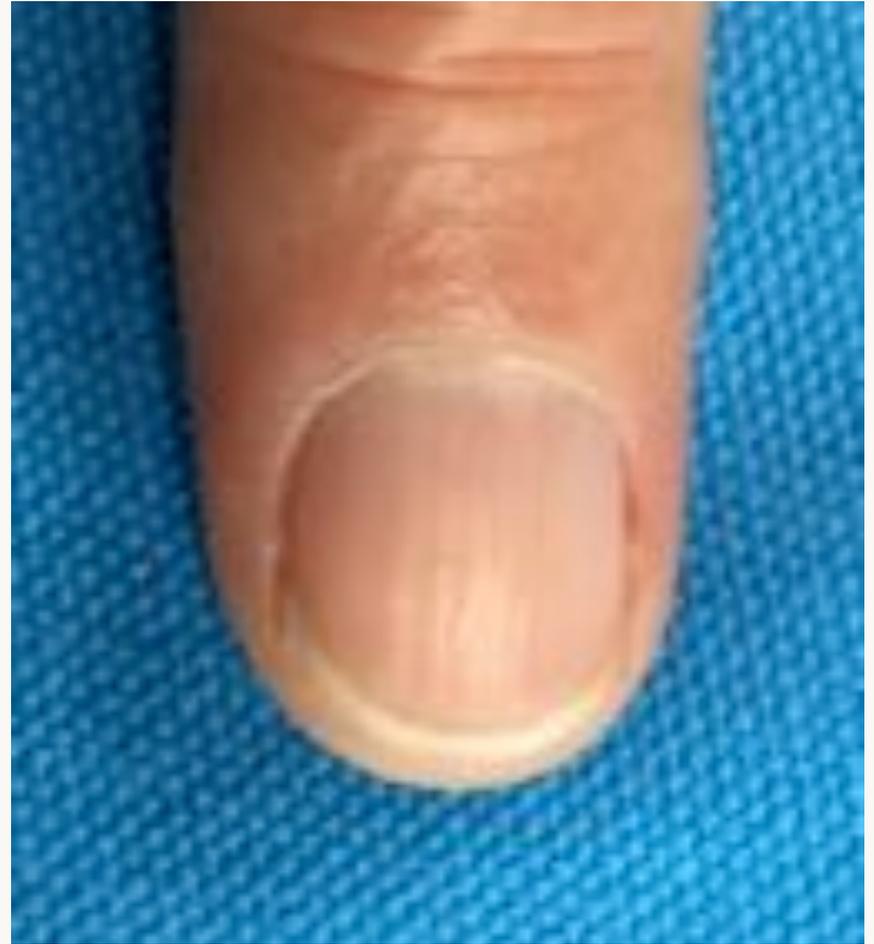
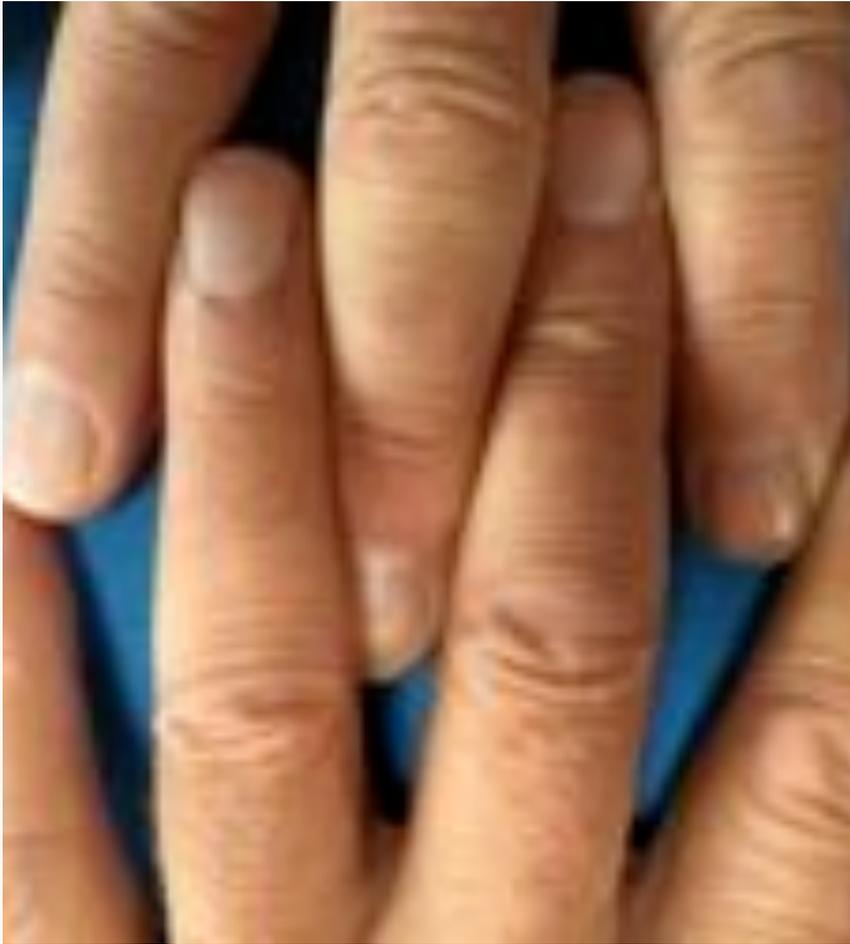
Arms



Hands



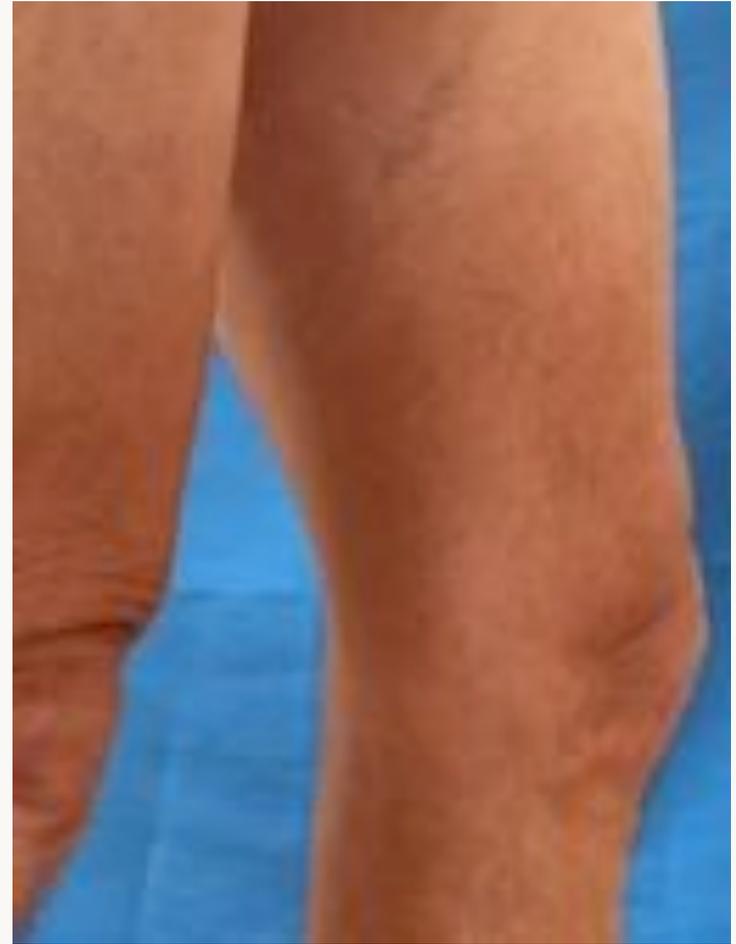
Nails



Legs



Legs



Legs

Good



Bad

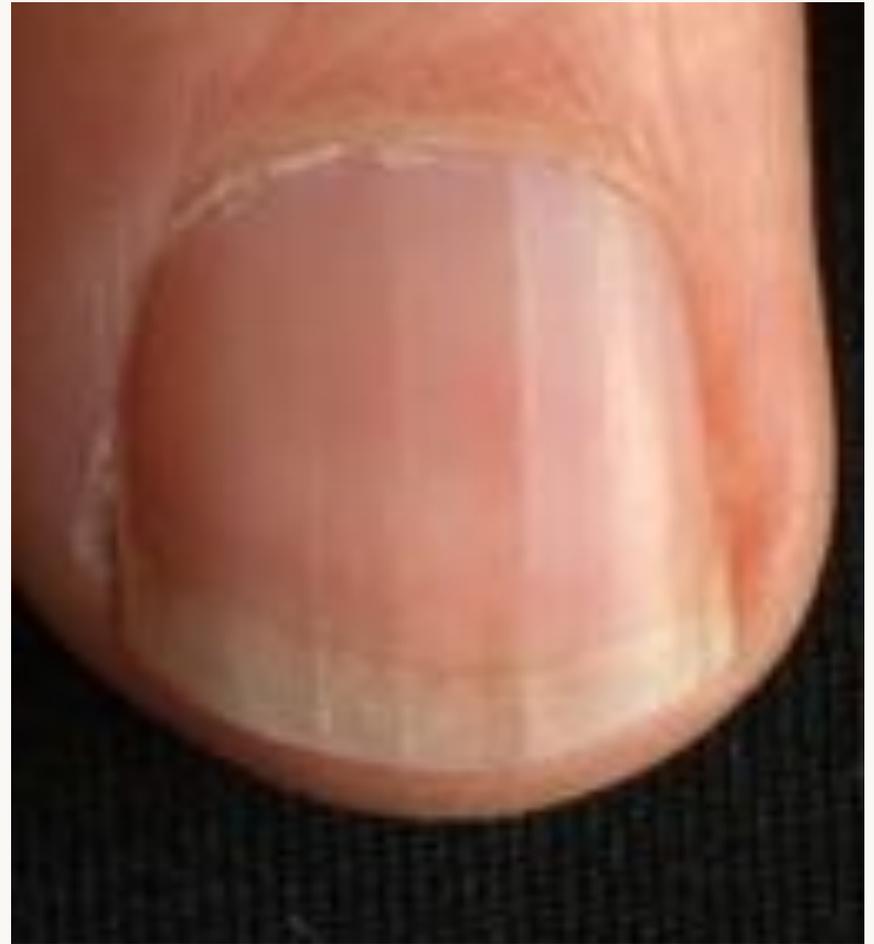


Feet



Close-up photography

- With and without a ruler where relevant
- If too close, back off and zoom to improve depth of field
- Hold camera still or use tripod



Close-ups of curved areas

- Nose, ears, lips
- Use a neutral-coloured card with a hole in it if your camera is struggling to focus or exposure is wrong

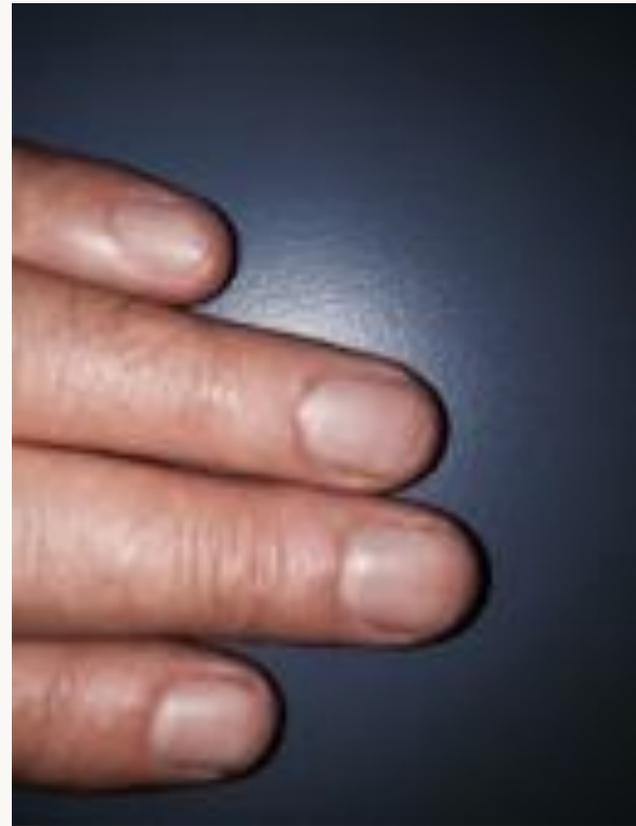


Close-up tips

Auto exposure/focus lock



Flash on



Camera+



To keep camera still

Tripod

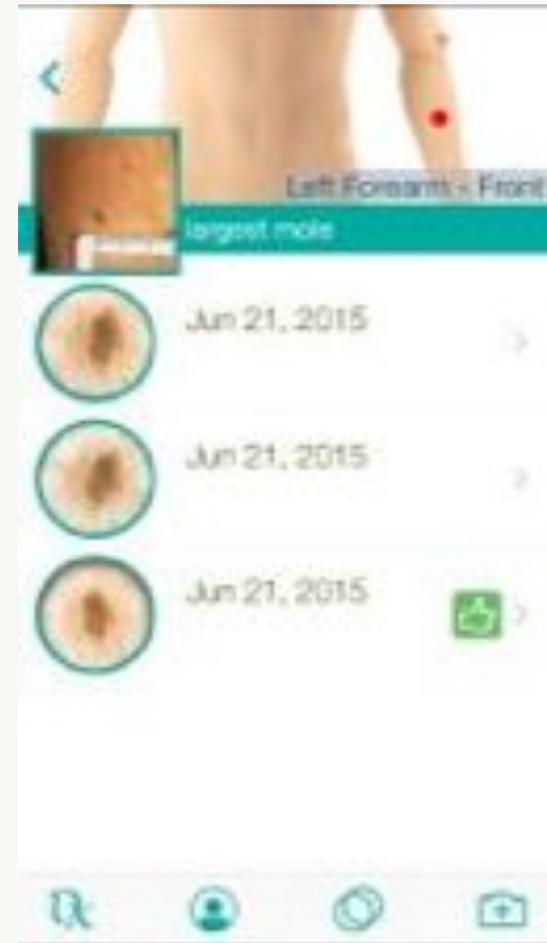


Timer



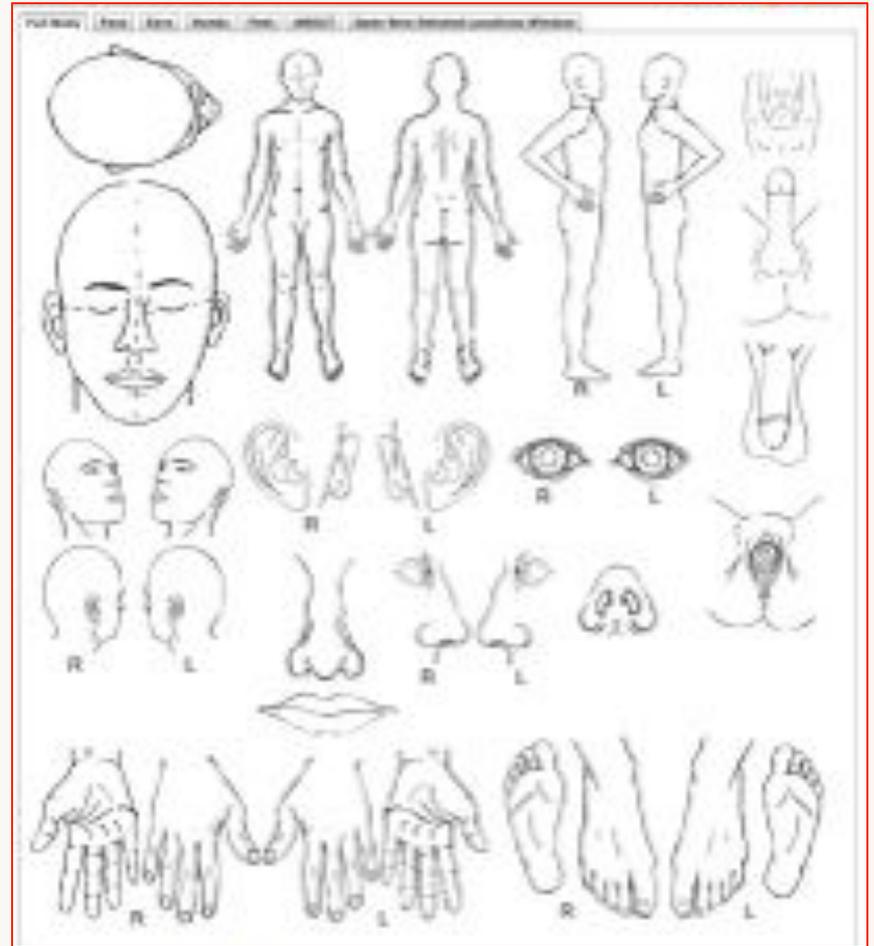
Skin lesion of concern

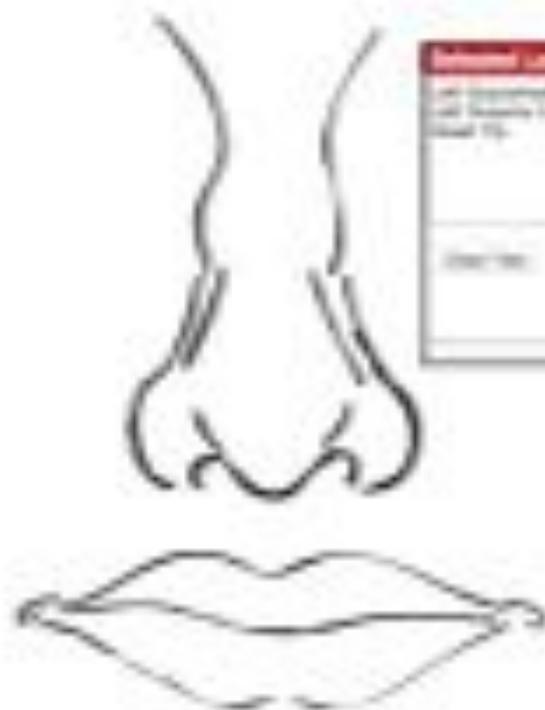
- Anatomic view
- Macro view
- Macro view with rule
- Dermatoscopic view



Locate the lesion precisely

- Anatomymapper.com
- Documentation
- Histopathology requests





Naevus

ID label



Remove hair



Dermatoscopic views

- Smartphone adapters for several devices
 - DermLite DL1, DL1 Basic, DL3, DLII HR Pro, DLII Hybrid
 - Opticlar
 - VEOS
 - Handyscope



Dermatoscopic images

- Contact with skin
- Polarised and/or nonpolarised views
- Apply fluid eg sanitiser



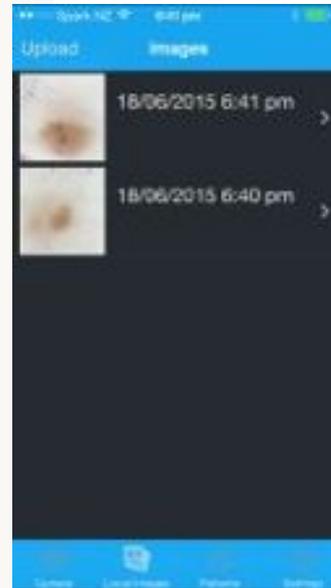
Why have a dermatoscopic camera?

- Referral to specialist
 - Dermatology
 - Teledermatology
 - Histopathology
- For follow-up
- It's fun!



Two iPhone cameras for the non-dermoscopist or patient

- MoleScope
- DermLite Monitor



MoleScope



MoleScope

iPhone 5

Buy now ~~Estimated~~ \$99.00



MoleScope Pro (for medical professionals)

iPhone 5

Buy now ~~Estimated~~ \$199.00



MoleScope device



MoleScope iPhone app

Register patient

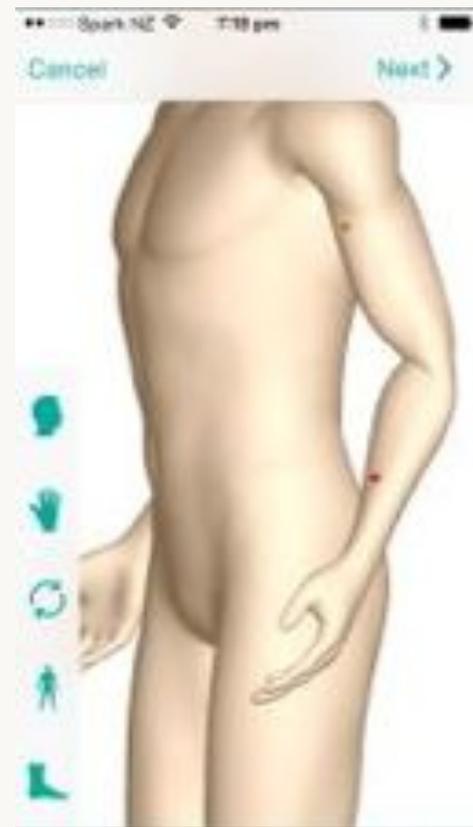


The screenshot shows the 'Add Patient' registration screen in the MoleScope app. The form includes the following fields and options:

- Name: David Oakley
- Gender: F M
- Ethnicity: White >
- Skin Type: >
- Date of Birth: 1950-05-29 >
- Cancer History: No Yes
- Family Cancer History: No Yes
- Device Serial Number: (empty field)

A teal 'Register Patient' button is located at the bottom of the screen.

Chose body site



Take the pictures

Overview image

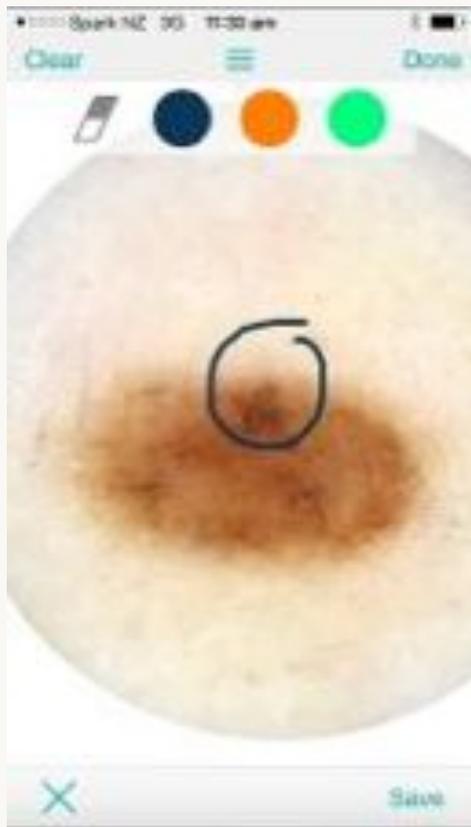


Dermoscopy image



Annotate

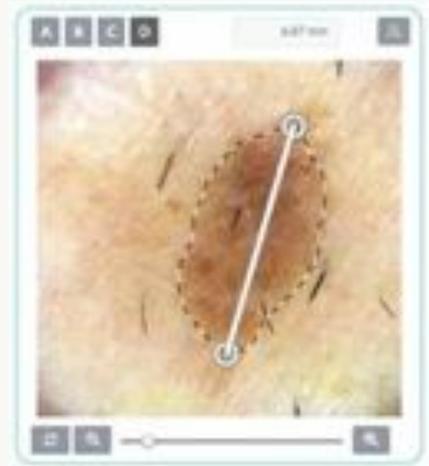
On device



Online



Evaluate the lesion

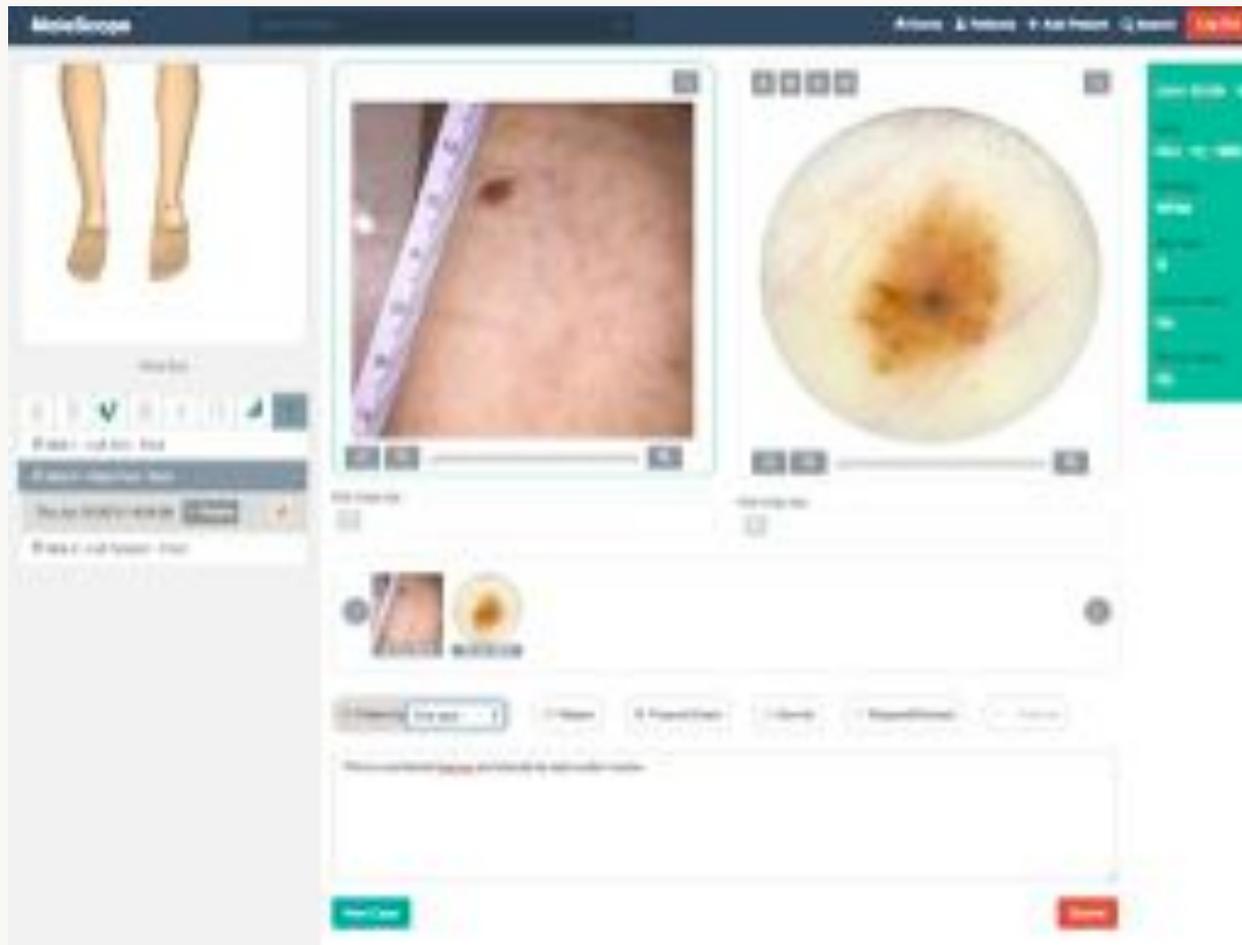


Dr. Amanda Oakley made the following diagnosis: Normal with the following note: Benign naevus stable

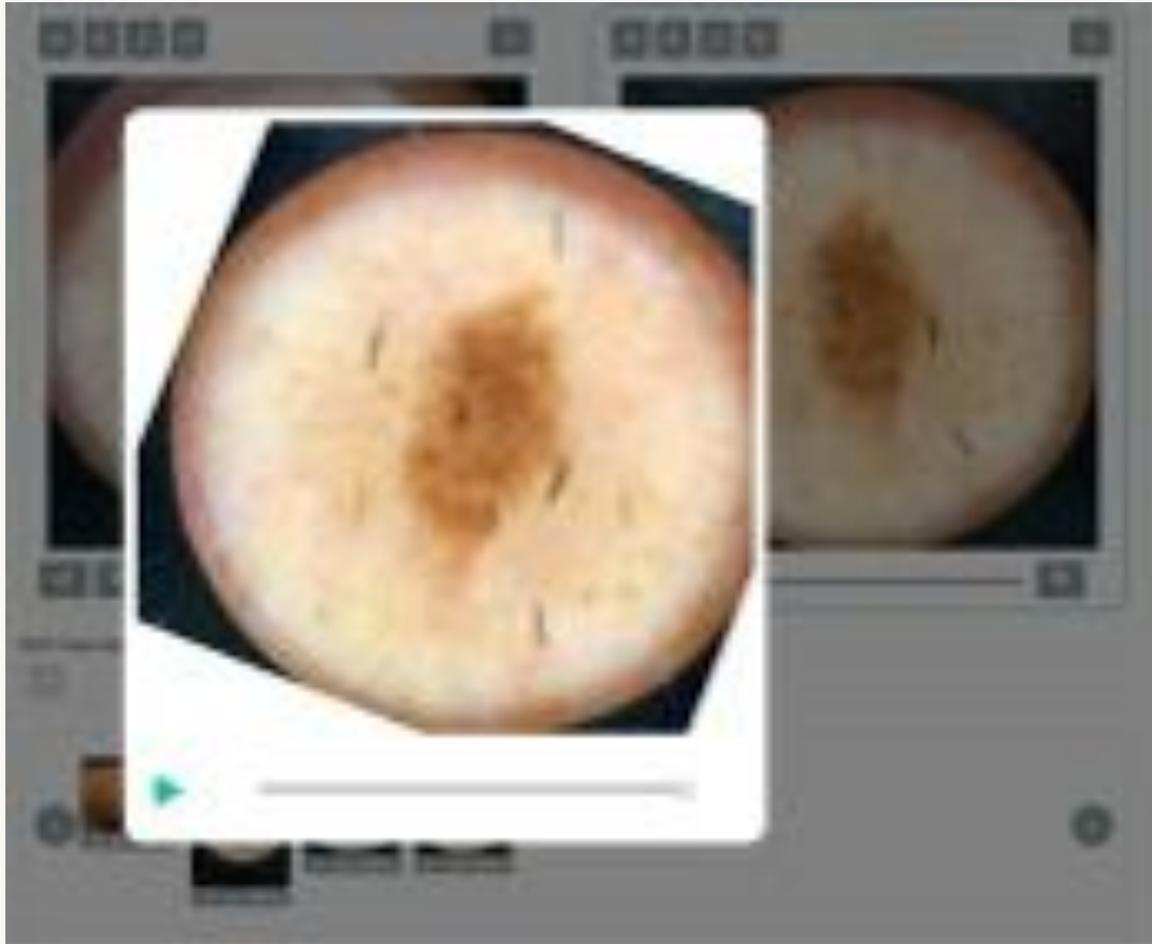
©6/21/2015, 10:33:03 AM

Report

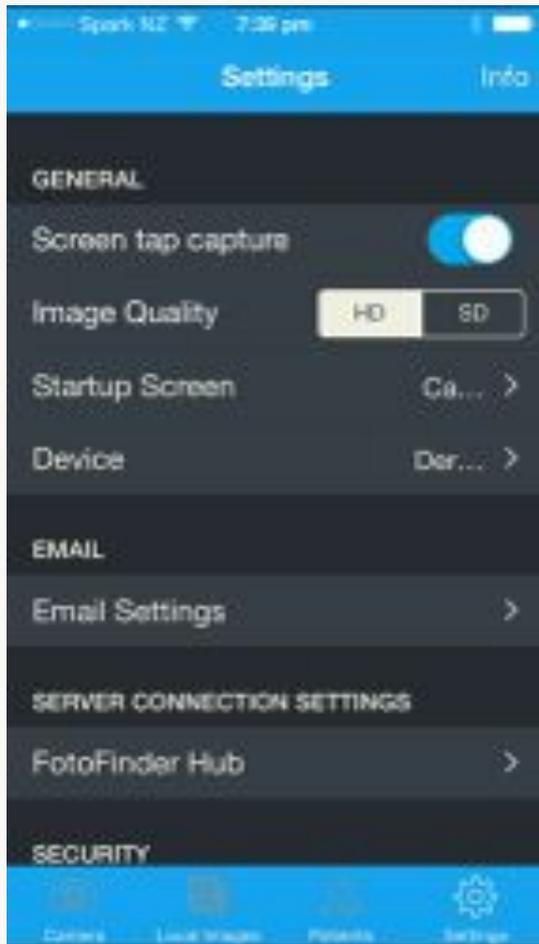
DrMoleScope.com



Automatic rotation for follow-up



Dermlite Monitor



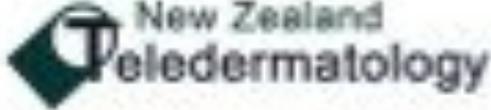
Referral to dermatology at WH

- Electronic referrals permit attachments
- However, currently:
 - Images often printed in B&W or over 2 pages
 - Providing advice is time consuming; it's easier to arrange an appointment
- In the future, we'll assess referrals online, which will help in triage and in advice

Teledermatology referral

- New Zealand Teledermatology provides an online advice service for GPs
 - Drs Oakley, Rademaker, Yung, Hill
- It is currently free to Waikato GPs
 - We charge organisations in other parts of NZ

www.teledermatology.nz



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Map of New Zealand

Welcome to New Zealand Teledermatology

What is New Zealand Teledermatology?

New Zealand Teledermatology provides dermatology services to health providers in New Zealand via a national internet-based telemedicine system (Connect2Teledermatology).

Established in March 2010, New Zealand Teledermatology, in partnership with GP organisations, District Health Boards and other health providers in New Zealand, has become critical advice from a dermatology perspective.

- For diagnosis where this is possible
- For triage and to refer to local or specialist services
- For advice regarding investigations and management

The aims of New Zealand Teledermatology

The aims of New Zealand Teledermatology are:

- To provide a virtual resource for General Practitioners and other health providers in New Zealand to assist in diagnosis and management of skin diseases in their patients.
- To engage dermatology consultants, all specialist, other specialists (where reasonably required) by the Medical Council of New Zealand.
- To establish a consultative relationship (through the website) between islands.
- To ensure confidentiality, privacy and security of consultations.
- To adhere to the recommendations of the Medical Council of New Zealand regarding internet-based advice.
- To address other advice or request internet guidelines.

We work closely with District Health Boards (DHBs), Integrated Health Centres, Primary Care Organisations, hospitals, and individual General Practitioners in New Zealand to ensure we provide the best possible teledermatology service.

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CollegiumTelemedicus.org



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Username:

Password:

[Log in](#)

[Create an account](#)

Collegium Telemedicus is an informal organization to assist people who wish to start and operate telemedicine networks to deliver health care in remote or low-resource settings.

A common scenario is that one or more doctors visit colleagues in a developing country, usually to conduct teaching and training. Recognizing the difficulties of obtaining specialist opinions there, they offer to support their colleagues by email on their return. Email support is duly provided, but proves not entirely satisfactory (confidentiality concerns, difficult to organize the right person to respond, no audit trail, etc). Establishing a formal telemedicine network is considered, but the initial start-up cost is a deterrent.

Collegium Telemedicus offers a new approach. There is no start-up fee (although we reserve the right to invite a donation towards running costs at a later stage). The software is made available on a secure server and can be accessed using any web browser.

CT statistics

29 networks
1152 users
280 referral sites
1787 cases

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Powered by [Simple Server](#)

Acknowledgements

- Grateful thanks to David Oakley
- iPhone support
- Anatomymapper.com
- Camera+
- PicSafeMedi
- DrMoleScope
- Dermlite

