Mole mapping and monitoring

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Outline of presentation

• The melanoma epidemic
• Benefits of early detection
• Risks of the second or subsequent melanoma
• What are atypical and/or dysplastic naevi?
• Monitoring: what, whom, where, when and why?
• Future developments
Melanoma
Ulcerated pigmented nodule on elderly white sun damaged skin - bad news.

- Male, 80 presented with blue/grey ulcerated nodular melanoma.

- Dead from brain, liver and lung metastases 6 weeks after this picture was taken in summer 2016
Our Vision: Creating a melanoma-free world through education.

Our Mission: Inspiring people to implement life-long habits for self-detection and prevention of skin cancer.

The Melanoma Education Foundation is a nonprofit organization devoted to saving lives from melanoma, a common skin cancer that is often deadly unless detected early before there are any symptoms. The Foundation increases awareness of melanoma two ways:
GP referrals up 41% in 5 years, mainly due to NICE guidance

The number of people in England admitted to hospital for skin cancer has risen by 41 per cent in the past five years, but much of the increase is due to a change in GP practice, scientists said.

A study by researchers at Public Health England found the number of hospital admissions for the treatment of skin cancer rose from 87,685 in 2007 to 123,808 in 2011, partly a result of new guidance issued to family doctors on treatment.

There was a 30 per cent increase in the hospital admissions for melanoma, the most serious type of skin cancer, and a 43 per cent increase in admissions for non-melanoma skin cancer, which is rarely fatal when treated effectively.
Melanoma now 5\textsuperscript{th} most common UK cancer excluding BCC+ SCC
A tale of two cancers...
Change in UK mortality 1971-2008

Cervical cancer deaths 957

Melanoma deaths 2,067
## Skin cancer statistics

<table>
<thead>
<tr>
<th>Cases</th>
<th>Deaths</th>
<th>Survival</th>
<th>Prevention</th>
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<tbody>
<tr>
<td>15,419</td>
<td>2,459</td>
<td>90%</td>
<td>86%</td>
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<tr>
<td>New cases of melanoma skin cancer, 2014, UK</td>
<td>Deaths from melanoma skin cancer, 2014, UK</td>
<td>Survive melanoma skin cancer for 10 or more years, 2010-11, England and Wales</td>
<td>Preventable cases of melanoma skin cancer, UK</td>
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South west skin cancer hub - a great source of data
Will education reduce skin cancer incidence?
Where’s the melanoma?
It’s not the obvious tumour...
Presented with bleeding BCC.

This melanoma, of which the patient was unaware was discovered on skin check.
If preventable, why not prevented?

Thick melanoma

Old photo shows a much thinner lesion 5 years earlier
Can I have my moles checked, doctor?

• Should we check individual moles, or the whole skin?
• Can the NHS fund this or should it be private?
• Who should be ‘checked’?
• How?
• By whom?
• At what intervals?
• And what are we looking for?
Stephen Hayes’ back!

- Lots of moles, several are atypical
- History of blistering sunburn in youth
- Family history of melanoma
- The 2 larger ones over the left scapula are dermatofibromas
- I don’t want to die from melanoma..
- But I don’t like having bits of me cut out thank you very much!
What do we mean by atypical or dysplastic moles?
Which of his 100+ moles will you cut out?
Which of his 100+ moles will you cut out?
• ATYPICAL NAEVI VERY RARELY DEVELOP INTO MELANOMA

• 80% OF MELANOMAS ARISE DE NOVO FROM CLEAR SKIN

• MONITORING IN HIGH RISK PATIENTS IS SAFE AND EFFECTIVE AT CATCHING NEW MELANOMAS AT A PRE-INVASIVE STAGE (IN SITU OR MINIMAL BRESLOW THICKNESS)
Patients with increased numbers of nevi are at increased risk for melanoma. The potential for nevi to serve as melanoma precursor lesions is controversial. The malignant transformation of an individual nevus is estimated to occur at a rate of 0.00005 to 0.003% per year.

In addition, the majority of melanomas arise de novo, and only 20 to 30% of melanomas are associated with a melanocytic nevus.

Therefore, we think that prophylactic excision of melanocytic nevi has a low potential to reduce melanoma risk and is not warranted. Instead, clinical surveillance with periodic skin examinations, dermoscopy, and photography are the strategies we suggest for early detection of melanoma.
Digital dermoscopic monitoring of atypical nevi in patients at risk for melanoma

• **Objective**: To determine the utility of monitoring dermoscopic photographs of atypical nevi in a high-risk population.

• **Methods**: Over a 4.5-year period, digital dermoscopic photographs were taken of clinically atypical nevi at initial and follow-up visits, such that side-by-side comparisons could be made.

• **Results**: A total of 5945 lesions were monitored in 297 patients over 3–52 months (median 22 months) and 324 lesions were biopsied. Photographic changes were noted in 96/5945 (1.6%) lesions, which included 64 dysplastic nevi (67%), 25 common nevi (26%), and one melanoma (1.0%). Of six melanomas biopsied during the follow-up period, only one was detected by dermoscopic photographic change at follow-up.

• **Conclusions**: Most clinically atypical melanocytic nevi are stable over time, and lesions exhibiting dermoscopic changes are most likely to be dysplastic nevi. While dermoscopy is a useful tool for clinical examination, the sensitivity of dermoscopic monitoring is limited by melanomas that may arise in normal skin or in clinically benign nevi that were not initially photographed.

• **JUST 1 OUT OF ALMOST 6,000 CLINICALLY ATYPICAL NAEVI DEVELOPED INTO A MELANOMA**
What is mole mapping?

The term ‘mole mapping’ has been used in several different ways. However, it usually refers to a surveillance programme for those at high risk of malignant melanoma. It may include a clinical skin examination and dermoscopy to identify and evaluate lesions of concern.

Mole mapping might simply involve marking spots on a cartoon drawing of the body (see self skin examination) to indicate the position of skin lesions of concern, particularly moles and freckles. Mole mapping is more likely to refer to conventional print photographs or digital images of the whole body’s skin surface. These can be reviewed at a later date to see if there are any new skin lesions, or whether pre-existing skin lesions have grown or changed colour or shape.

Some systems rely on automated machine detection of new or changed lesions and/or automated diagnosis. These machines are increasingly accurate but should not be used as a substitute for clinical evaluation by a doctor.
Digital mole mapping

Sophisticated digital mole mapping programmes may include the following:

- Risk evaluation i.e. age, medical and family history, skin typing, sun exposure
- Patient education regarding sun protection, moles and melanoma
- Skin examination by a health professional (usually a doctor or specially trained nurse)
- High quality digital images (photographs taken with a digital camera)
  - Standardised poses of the whole body, with lesions of concern carefully localised (this can require very accurate positioning and sophisticated computer programming if there are several similar moles in close proximity)
  - Close-up macro images of the lesions of concern
  - Dermoscopic images of lesions of concern
- Evaluation of the images by an expert in skin cancer, usually a dermatologist
- A report to the patient and/or referring health practitioner including suspected diagnoses and recommendations for treatment of lesions of concern
- Follow-up mole mapping in 3 to 6 months for lesions of concern that do not reach the threshold for excision
- Follow-up mole mapping of all imaged lesions at intervals of 1 to 2 years or as recommended by your doctor
- A secure database and transfer system to store the images and reports
- Copies of the images for the patient or doctor to aid in self skin examination
Atypical naevi indicate increased risk, but are not themselves premalignant.

- When someone has many atypical naevi, we cannot reasonably cut them all out.
- Atypical naevi are defined as acquired naevi over 5mm in diameter with asymmetry of shape and colour but no clear cut signs of melanoma.
- the answer is monitoring.
Mole mapping and digital monitoring

basic principles

• The risk of a new melanoma is increased in the following situations

- previous history of melanoma
- large number of naevi, especially if over 100
- 2 or more atypical naevi
- severe sun damaged skin
- immune suppression (main risk here is squamous cell cancer)
How should we monitor patients with atypical moles?

- advise patient to observe their own moles?
- advise patient to photograph own skin?
- professional medical photography individual naevi?
- professional medical photography of areas e.g. back, legs, face?
- professional medical photography of whole skin?
- digital photography of whole skin, with or without digital dermoscopic imaging of particular moles which are atypical?

Cost effectiveness and resources must be taken into account in case selection. Currently, practice varies considerably. More research is needed!
How to monitor patients with atypical moles? : hierarchy of techniques and cost

- Advise patient to observe their own moles
- Advise patient to photograph own skin
- Professional photography individual naevi
- Professional photography of areas e.g. back, legs, face
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Increasing cost
How do we do mole mapping and monitoring?

• Choose the right patients
• Whole skin photography
• 2 sets of prints, one to patient, one to notes
• Show patient (ideally with partner or friend) how to check their skin against the photos
• Action any new or changed lesions
• What interval? 3 months is standard, 6 or 12 months may be OK longer term
• For how long? Debateable, also subject to resources.
• Technology and research findings are changing—none of this is set in stone!
How to check the skin with mole mapping

At it’s simplest, monitoring consists of comparing the patient’s whole skin against the photos.

If there is no change over time, lesions can be safely assumed to be non malignant, even if they look quite odd.
Compare the photos with the patient’s skin. We are looking for moles which are new or changed.
No change over 6 months is very reassuring
Most melanomas change visually over 3 months
Mole mapping and monitoring - discussion and an example

This patient gave written permission for these images to be shared for the purpose of education.

He was mole mapped and followed up after the excision of a thin melanoma.

Several other naevi have been excised, all proved to be benign (labelled mildly dysplastic.)
These moles were unchanged over 3 years

• Failure to change over this length of time is strong evidence that they are all completely harmless and should NOT be excised ‘as a precaution’
These atypical naevi are non symmetrical with variable brown colour and patterns, but lack Argenziano’s 7 features of melanoma

- Atypical pigment network
- Blue grey areas
- Radial streaming (streaks/pseudopods)
- Irregular black blotches
- Irregular dots and globules
- Atypical vessels
- Regression structures
- (I would add shiny white streaks)
No moles had changed over 3 years of monitoring, we can therefore safely say they are harmless

• NB this is ‘a case study of one’ but agrees with and illustrates the published trial evidence mentioned earlier (hyperlinks to these studies in final slide, included on your delegate memory drive)
How to use mole mapping

‘spot the difference’

At it’s simplest, monitoring consists of comparing the patient’s whole skin against the photos.

If there is no change over time, lesions can be safely assumed to be non malignant, even if they look quite odd.
Just like star spotting in the night sky
Multiple primary melanoma: the impact of atypical naevi and follow up.

**BJD** [2010, 163(6):1319-1322] De Georgi et al

- Melanoma patients in Florence, Italy between 2000 and 2004 had their records evaluated
- The presence of atypical naevi was associated with a greater risk of getting a new melanoma, odds ration 3.28
- Those who were followed up and had a new melanoma had an average Breslow thickness of 0.36mm
- Those who did not attend follow up, when they presented with new melanomas the average Breslow thickness was three times thicker at 1.22mm
- This study provides objective evidence that careful follow up of high risk melanoma patients is associated with the detection of significantly thinner and therefore much more survivable melanomas
- Conclusion: **Follow up of high risk melanoma patients is effective in detecting new melanomas at an earlier stage.**
Short term or long term monitoring?

**Short term monitoring**
- Suitable for individual lesions
- Only monitor flat lesions, which are a bit odd but have no positive features for melanoma
- Dermoscopic photography is essential
- 90% of early melanomas will have changed over 12 weeks
- (beware, some are very slow growing)

**Long term monitoring**
- Suitable for patients at high risk due to multiple naevi, atypical mole syndrome, personal history of melanoma
- Immune suppressed?
- TBP (total body photography) with or without dermoscopy of selected naevi
- Most melanomas picked up are on monitoring are in situ or very thin.
Internationally, people are encouraged to get their skin checked annually.

Germany has rolled out universal skin screening for the over 40s (evidence of benefit is awaited)

There is now strong international evidence that all high risk patients should be monitored. The risk is life long and may increase with age, so when should monitoring end?
COMPARISON OF SEQUENTIAL IMAGES

Digital dermoscopic monitoring
Professor Harald Kittler
University of Vienna
Follow-up: 7 months, Melanoma in situ

Follow-up adds diagnostic information
Digital dermoscopic monitoring images by kind permission of Professor Harald Kittler, University of Vienna
NB the change is usually at the periphery of the naevus
How close to the wind dare we sail?
Aged 80, lesion had changed over several years.
Aged 80, lesion had changed over several years.

- Fingerprint pattern (fine parallel curved lines)
- ? Blue clods near centre?
- Mildly chaotic
- 6mm punch biopsy taken-

- Diagnosis = solar lentigo, no malignant features
- Could lesions like this be safely monitored?
What about apps and commercial mole mapping?

Better, easier skin tracking. Guaranteed.

Skin cancer can spread quickly. Early detection saves lives. Catch it sooner.
Check any mole for skin cancer risk

Detect changes to your skin as early as possible and take action

How does it work?

1. Take a picture
Halt the device over a mole or skin condition and take a picture.

2. Analyse
The app will analyse the spot in an instant and give you a recommendation

DOWNLOAD FOR FREE
There are MANY mole watching Smartphone apps out there, new ones are being created all the time.

We don’t endorse any (the jury is out) but there is likely to be some value.

Potential down side: may be tie ins with skin surgeons (overdiagnosis + monetisation) and patients may not select the right lesions to photograph.
Patient performed dermoscopy with Teledermatology

• Fifty-eight Australian adults aged 50-64 years performed skin self-examination and photography using a cheap Smartphone dermoscope at home

• A total of 309 lesions were patient-photographed and emailed to a dermatologist.

• The patient=performed dermoscopic images were of adequate quality and telediagnosis of the lesions correlated well with clinical diagnosis

• The sensitivity of skin self-examination plus mobile teledermoscopy was 81.8% with the patient as denominator and 41.9% with the lesion as denominator.

• However, patients photographed many banal lesions and missed some suspicious ones

• CONCLUSION: the details may require some work, but patient performed skin self examination (SSE) with Smartphone dermoscopy is feasible.
Mole monitoring—in conclusion

• We have a melanoma epidemic
• Public demand for screening and monitoring will increase
• Monitoring of **high risk** patients is safe and cost effective. Based on the evidence, it should be happening routinely.
• The benefits of monitoring lower risk patients are uncertain
• Self monitoring by patients using Smartphone apps is feasible
• There are likely to be further developments in this area
Hyperlinks to studies cited in this presentation

- http://europepmc.org/articles/PMC2292405
- http://www.dermnetnz.org/topics/mole-mapping/