The Role of Whole Body Imaging & the Opportunity for Screening

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Conflicts of Interest

e-derm-consult GmbH
MoleMap Australia
iDoc24
MetaOptima Inc
FotoFinder
Canfield Scientific Inc
The Clinical Challenge
Figure 2. SROC curves for the performance of the clinical diagnosis without dermoscopy (red line), dermoscopy by experts (black line), and dermoscopy by non-experts (blue line).

The Clinical Challenge
Reducing Unnecessary Biopsies

SPECIMEN 5. NO. 5 – BENIGN COMPOUND MELANOCYTIC NAEVUS.

SPECIMEN 6. NO. 6 – BENIGN LENTIGINOUS JUNCTIONAL MELANOCYTIC NAEVUS.

SPECIMEN 7. NO. 7 – BENIGN LENTIGINOUS JUNCTIONAL MELANOCYTIC NAEVUS.

SPECIMEN 8. NO. 8 – BENIGN COMPOUND MELANOCYTIC NAEVUS.

SPECIMEN 9. NO. 9 – UPPER DERMAL SCAR.

SPECIMEN 10. NO. 10 – BENIGN LENTIGINOUS COMPOUND MELANOCYTIC NAEVUS.

SPECIMEN 11. NO. 11 – BENIGN LENTIGINOUS JUNCTIONAL MELANOCYTIC NAEVUS.

SPECIMEN 12. NO. 12 – BENIGN LENTIGINOUS JUNCTIONAL MELANOCYTIC NAEVUS.

SPECIMEN 13. NO. 13 – BENIGN LENTIGINOUS JUNCTIONAL MELANOCYTIC NAEVUS.

SPECIMEN 14. NO. 14 – BENIGN LENTIGINOUS JUNCTIONAL MELANOCYTIC NAEVUS AND ADJACENT DERMAL SCAR.

SPECIMEN 15. NO. 15 – BENIGN INTRADERMAL MELANOCYTIC NAEVUS.

SPECIMEN 16. NO. 16 – BENIGN INTRADERMAL MELANOCYTIC NAEVUS.

SPECIMEN 17. NO. 17 – BENIGN INTRADERMAL MELANOCYTIC NAEVUS.

SPECIMEN 18. NO. 18 – BENIGN LENTIGINOUS COMPOUND MELANOCYTIC NAEVUS.
Reducing Unnecessary Biopsies

Participant case study:
57 year old male with dysplastic naevus syndrome
Previous diagnoses of a Level 2 melanoma in 2015 and a Level 1 melanoma in March 2018
GP recommended excision of circled naevi in July 2018, diagnosed as two Level 1 melanomas

June 2018

September 2018 (3 months)

December 2018 (6 months)
Reducing Unnecessary Biopsies

Participant case study:
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June 2018  September 2018 (3 months)  December 2018 (6 months)
Imaging Solutions: Dermoscopy

Non-invasive in vivo imaging technique with 10X magnification & illumination

Skin covered with a transparent medium or a polarised filter to minimise skin surface reflectance

First article describing the use of total-body photography to image naevi.
A high incidence of melanoma found in patients with multiple dysplastic naevi by photographic surveillance

John W Kelly MD BS, FACD. Josephine M Yeatman MB BS, GradDipEpi. Cheryl Regalia. Grahaume Mason MB BS, FRCPA, Amanda P Henham BAppSci(Photog), SRN


First article using photographic surveillance to monitor changes in naevi (two year follow-up). Now adopted into various surveillance services for melanoma worldwide.
Imaging Solutions: MoleMap

Health service model for melanoma surveillance

- 250,000+ patients (NZ, Australia) have chosen MoleMap
- 5 million+ moles checked
- 30+ clinics around Australia
- Whole-body approach to patient imaging
Imaging Solutions: Fotofinder

FotoFinder ATBM (Automated Total-Body Mapping)

Offers consistent and automatic whole body documentation including:

- Mole mapping
- Psoriasis + computer-assisted PASI assessment
- Vitiligo
- Inflammatory skin conditions
Imaging Solutions: Canfield Scientific

Canfield’s Vectra WB360 Imaging System

- Captures nearly the entire skin surface in a 3D image
- Macroquality resolution
- Imaging takes a few seconds
- Lesions can be annotated between timepoints with dermoscopy
- Captures details of both pigmented lesions and inflammatory skin conditions (e.g. psoriasis, vitiligo)
Clinical Perspective of 3D Total Body Photography for Early Detection and Screening of Melanoma

Jenna E. Rayner, Antonia M. Laino, Kaitlin L. Nufer, Laura Adams, Anthony P. Raphaeli, Scott W. Manzie, and H. Peter Soyer

Front Med (Lausanne) 2018 May 23;5:152.

First article establishing the use of 3D total body photography to improve early melanoma detection.
Imaging Solutions: 2D vs 3D Photography

- Time consuming.
- Requires multiple separate images of the patient to be taken in a variety of anatomical positions.
- Manipulation of a 3D surface into a 2D photograph can compromise the accuracy of the image.

- Rapid acquisition.
- Single anatomical pose.
- Image in 3D, more closely reflecting clinical exam.
- Accurate spatial representation of body and naevi.
2018 Grant Application for the ACRF ACEMID
ACRF Australian Centre of Excellence in
Melanoma Imaging & Diagnosis
Executive Committee

Prof H. Peter Soyer
Project & QLD Lead
The University of Queensland

Prof Graham Mann
NSW Lead
The University of Sydney

Dr Victoria Mar
VIC Lead
Monash University

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Clinical & Health Service Evaluation

Prof Joanne Aitken
Cancer Council Queensland

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The University of Sydney

A/Prof Rachael Morton
The University of Sydney

Informatics

Prof Len Gray
The University of Queensland

Dr Liam Caffery
The University of Queensland

Prof Rory Wolfe
Monash University
Team Capability

- Bioinformatics
- Implementation science
- Primary care
- Consumer engagement
- Dermatology
- Behavioural science
- eHealth
- Health informatics
- Bio-statistics
- Molecular genetics
- Epidemiology
- Surgical oncology
- Pathology
- Health economics
Health Service Partners

Cash-support: $2,290,000
In-kind support: $6,332,522

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ADDITIONAL PARTNERS

NSW GOVERNMENT Melanoma Institute Australia
NSW GOVERNMENT Health Sydney Local Health District
NSW GOVERNMENT Health Western Sydney Local Health District
eHealth

QUEENSLAND Sunshine Coast Hospital and Health Service

Cairns and Hinterland

Metro South Health

Gold Coast Health

eHealth Queensland

North West Queensland Health

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Peter MacCallum Cancer Centre

Victoria Australia

Skin & Cancer Foundation

Department of Human Services

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NEW SOUTH WALES
Research & Clinical Network

- 3,000 visits / instrument / year.
- 100,000 3D avatars and >5M naevi over the next 3 years.
- 50% with 1 and 2 year follow-up imaging.

The world’s largest and most comprehensive skin imaging database
Mission Statement

Transform melanoma early detection using total body surveillance to enhance individual lesion management

Mission

Research aims

Diagnostic Intelligence
Improve early detection and risk stratification using total body images integrated with history, clinical phenotype and genotype.

Health Service Evaluation
Total body imaging will reduce unnecessary biopsies by better ‘hit’ rate, improving cost for patients and the healthcare system.

Informatics
Integrate total body imaging into a telehealth network and EMR through implementation of image standards.

Critical infrastructure

ACRF funded telemedicine network of 15 total body imaging research nodes

Outcomes

• World’s largest, most comprehensive skin imaging database.
• Reliable solutions for melanoma early detection.
• Facilitate artificial intelligence.

• Research-validated ACRF infrastructure underpinning the first nationwide melanoma screening trial.
Clinical Implementation

Images acquired at remote sites in DICOM format

3D Total Body Imaging Systems on telehealth network

Image reviewed and reporting workstation

Dermatologist reviews images using DICOM format

Images acquired at remote sites in DICOM format

Picture Archiving & Communication System (PACS)

Image stored in DICOM repository

Referring or reporting clinician uses EMR to view images via enterprise image viewer

EMR

Referring or reporting clinician uses EMR to view images via enterprise image viewer
Single Lesion vs Total Lesions Capture

**Current status**
- Lesion-focused analysis from individuals.
- Non-standard imaging.
- Limited / variable meta-data.
- No change.

**ACRF ACEMID capabilities**
- Complete lesions assessment from all participants.
- Standardised and reproducible imaging.
- Extensive history, phenotype and genotype meta-data.
- Sequential imaging.
Genetic Predisposition To Melanoma

3 Melanomas
87 Naevi
Dark brown hair
Brown eyes
Fair skin

Heterozygote for albinism
Tyr
PALB2
LIG1
MC1R r/r

2 Melanomas
1 Naevi
Light brown hair
Blue eyes
Fair skin

DNA repair defect
MC1R WT/r
ATM
RAD54L
SETDB1
POLG