DISCOVER — ENGAGE — IMPACT

EARLY DE-TECH-TION

Skin cancer research at UQ is leading the charge to improve early detection and diagnosis, with several breakthroughs so far helping to improve treatment possibilities that will eventually save the lives of millions worldwide.

"The ultimate goal is clear – no one should die of skin cancer."

The UQ Chair in Dermatology and Director of the Dermatology Research Centre at the UQ Diamantina Institute, Professor H Peter Soyer, is determined to make this objective a reality.

But with Australia's high UV index, love of beach culture and affinity for spending time outdoors, is this ambitious goal possible?

The statistics are sobering.

Accounting for 80 per cent of all cancers diagnosed in Australia each year, skin cancer is the most common form of cancer diagnosed – four times more likely to occur than any other – and two in three Australians will be diagnosed with it by the age of 70. Nationally, skin cancer is responsible for around 2000 deaths every year.

Memorable prevention campaigns like 'slip, slop, slap' – now expanded to include 'seek' for 'seek shade' and 'slide' for 'slide on sunglasses' – have had some success in raising awareness and changing attitudes and behaviours. However, to effectively reduce Australia's skin cancer mortality rate, early detection and treatment are essential.

Enter Professor Soyer and his teams of dedicated researchers, who are pioneering innovative ways to better detect, diagnose and even predict the three main types of skin cancers – melanoma, squamous cell carcinoma and basal cell carcinoma.

The UQ-led Centre of Research Excellence (CRE) for the Study of Naevi, funded by the National Health and Medical Research Council (NHMRC), is a collaborative project between UQ, QIMR Berghofer Medical Research Institute, Cancer Council Queensland, University of Sydney and Queensland University of Technology.

Professor Soyer heads the research initiative, based in the UQ Diamantina Institute at the Translation Research Institute (TRI) in Brisbane, which investigates a variety of pathways to the early detection, diagnosis and prediction of skin cancers.

"For the general population, the earlier the cancer is detected, the better the outcome," he says.

Non-invasive advances

One early detection breakthrough is the minimally invasive microbiopsy that could hold the key for molecular detection of skin cancers.

While traditional biopsies collect a chunk of skin several millimetres across, the UQ-developed microbiopsy device takes only a very small skin sample, removing the need for anaesthesia and sutures and leaving only a pinprick-like wound behind.

"It takes only a quarter of a millimetre of skin – or 1500 cells – for molecular diagnosis, which eliminates the unnecessary excision of suspicious benign lesions and alleviates the fear of excisions that many people have in the diagnostic process," says Professor Soyer.

CRE is tackling this major issue with a 'divide and conquer' tactic, with multiple major research projects currently underway.

Digital approaches to detection and diagnosis

An innovative 3D-imaging technology is at the core of one of the Centre's projects that will revolutionise mapping and monitoring of high-risk patients and early detection and diagnosis of skin cancers.

The VECTRA Whole Body 360 imaging system uses 46 cameras to construct a 3D avatar of a patient with detailed reproduction of the skin.

An extra camera captures and adds dermoscopic images of individual lesions to the avatar, which can show additional features of the lesion.

"The primary use of the total body photography system will be to track changes in skin lesions, which are a tell-tale sign of a developing skin cancer," Professor Soyer says.

This record of the patient's whole skin surface can be referred to during follow-up visits to detect changing moles, revolutionising the way skin cancers and conditions are mapped, monitored and diagnosed.

Researchers are also studying how mobile teledermoscopy – that is, detectors attached to smartphones – could be used for skin self-examinations, allowing patients to keep track of their own lesions over time to improve early detection.

Pre-empting susceptibility through genomics

To take early detection to the next level, world-renowned researchers from The

University of Queensland are collaborating on the first study to ever pre-emptively identify a patient's potential susceptibility to skin cancers, by determining which genes they carry that could cause skin cancers.

"We see that some people who have moles and don't go into the sun much still have a propensity for melanoma, due to their genetic background," Professor Soyer says.

The study will look for predictors – such as a patient's number of moles, skin pigmentation and hair colour – to identify those most at risk, as well as biomarkers – molecules in the blood or genetic variants – that might indicate a person is at greater risk.

"Genomics, combined with known clinical risk factors, could help unlock and determine those at highest risk of developing the deadliest form of skin cancer, melanoma – then we will tailor a personalised screening program," Professor Soyer says.

"If they have a lower risk, then they can choose to do regular skin self-examinations and see their doctor once a year for a check-up.

"However, if they've been identified as having a high risk, then their skin will be monitored through a screening program that may involve more frequent checkups, whole body imaging and mobile phone technology, and microbiopsy for the molecular detection of skin cancers."

Ultimately, all skin cancer research undertaken by the teams working on these projects aims to establish and implement protocols for personalised and targeted screening and monitoring of skin cancers, which in turn will lead to better outcomes for patients.

With a network of dedicated researchers working tirelessly to produce breakthroughs like these for better detection, diagnosis and prediction of skin cancers, Professor Soyer's goal may just be possible within our lifetime.

uq.edu.au/research/impact

(Image credit: iStock/LFO02)

Timeline:

2007: Professor H Peter Soyer is appointed inaugural Chair in Dermatology by The University of Queensland

2011: National Health and Medical Research Council (NHMRC) grant is received to research the effects of naevogenesis susceptibility genes and phenotypic correlation with dermoscopic characteristics of naevi

2012: Australian Research Council (ARC) grant towards the development of image-guided skin microbiopsy technology is received

2014: First detailed description of naevus phenotype of MITF E318K mutation carrier melanoma patients is published

2015: ARC Discovery Project grant is awarded for engineering the next generation of terahertz laser imaging systems in skin cancer

2015: Five-year NHMRC Centre of Research Excellence (CRE) grant is awarded for the study of naevi

2016: Australian Skin and Skin Cancer Research Centre (ASSC) is established with joint funding from UQ and QIMR Berghofer Medical Research Institute

2017: Professor H Peter Soyer is awarded a Queensland Genomics Health Alliance (QGHA) grant for a genomics approach for screening of patients at high risk of melanoma

Contact details:

Professor H Peter Soyer, School of Medicine and UQ Diamantina Institute
Email: p.soyer@uq.edu.au
Phone: +61 7 3443 8017
Web: researchers.uq.edu.au/researcher/1918
or dermatology-research.centre.uq.edu.au/profile/37/professor-h-peter-soyer