

Context about problem:

Skin cancers are malignant tumours of the basal cells, keratinocytes and melanocytes found in the epidermis. Skin cancers are divided into melanoma and non-melanoma skin cancer (NMSC). The incidence of melanoma has been rapidly increasing over the last 30 years. Skin cancers in the Asian context are often diagnosed at a later stage where the disease is more advanced and widespread, resulting in high morbidity and mortality. According to the Singapore cancer registry annual registry report 2015, skin cancers, including melanoma, ranked 6th in male cancers (1822 cases accounting for 5.8%) and 7th in female cancers (1404 cases accounting for 4.2%) for the period 2011- 2015.

Early detection and accurate diagnosis is crucial, especially for melanomas. This will allow for prompt treatment, reducing mortalities and morbidities. Dermatoscopes can be bought easily, with the cost of an advanced model around \$2000. However, the device is bulky and requires an adapter to allow pictures to be taken either via a handphone or a camera. The attachable devices for the handphone are limited to a few handphone models and this limit widespread use of handphones to take dermatoscopic images for references and analysis.

The Challenge Owners from the National Skin Centre team are developing an artificial intelligence (AI) software platform that will aid with the diagnosis of melanoma utilising a modified ABCD (Asymmetry, Borders, Colour, Dermoscopic structures) criteria.

Current project in development:

(1) Develop an artificial intelligent software platform to aid clinicians in better characterising and classifying pigmented lesions on dermoscopy, with a focus on diagnosing melanomas.

(2) Develop and automated adaptable attachable economical dermatoscope for use with all smart phones. This allows immediate analysis of the images obtained from a lesion in question, utilising the AI software in the form of a hand phone application.

With the proposed software platform, as well as the ease of obtaining dermatoscopic images via the attachable dermatoscope, allowing rapid analysis of the images, patients will be able to receive a more confident diagnosis at the first visit. This can be extended to primary care and family physicians will be able to offer a more certain diagnosis with the aid of the proposed software platform and device. This allows for discussion and appropriate referrals to tertiary institutions for the management of highly suspicious lesions. This reduces patient and family anxiety and allows for prompt management if needed. This will reduce unnecessary biopsies and clinical visits, leading to a reduction in overall healthcare costs.

The eventual plan would be to incorporate the AI software into a phone application to allow for ease and convenient use, and scale up the production of the attachable economical dermatoscope for use with all smart phones.