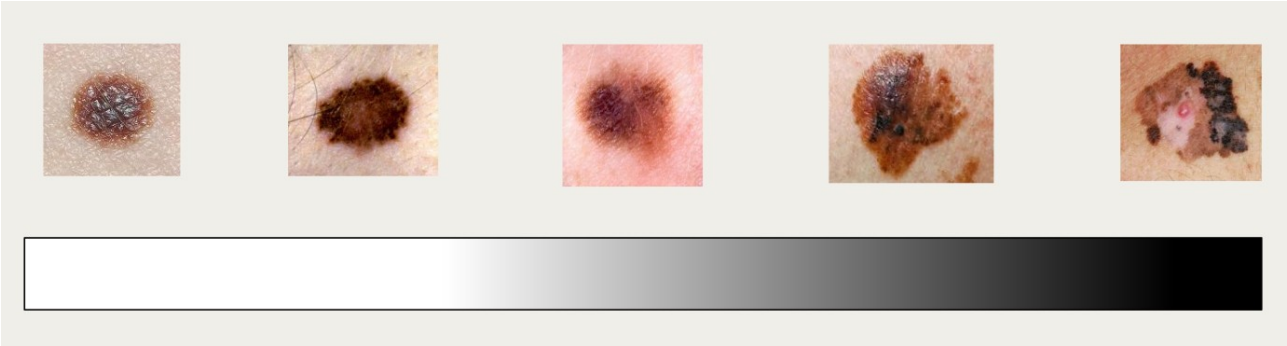
Background



Melanoma is one of the deadliest types of skin cancer due to its high metastatic propensity. If melanoma is diagnosed at an early stage, patients have a good prognosis. There are digital image analysis systems on the market (e.g SkinVision, TeleSkin) to help identify suspicious skin lesions, but these focus on the *general population*, rather than in *high-risk patients* with a known predisposition for developing malignant lesions [1]. Decision support systems for the general population have been shown to be unreliable when used in high-risk populations [2]. In these populations, it is very challenging even for an experienced dermatologist to differentiate malignant from benign lesions: the dermatologist now excises 5-10 benign melanocytic nevi (moles) for each melanoma, resulting in >50,000 unnecessary excisions performed annually.

The aim of this project is to create a deep learning-based tool for decision support in clinical practice, focused specifically on the boundary/difficult cases in high-risk patients. We may also consider integration into a deep learning framework of heterogeneous information sources in combination with the clinical imaging data, which are not always available to patients and general practitioners, namely: dermoscopy images, information about phenotypic risk factors (number of naevi, skin type), environmental risk factors (UV exposure) and, if necessary, genetic information.

You are expected to work in close relation with the LUMC hospital on cleaning and preparing the data as well as developing a deep learning approach towards detecting high risk melanoma cases. Possible research directions are: hard-example learning [3], and fine-grained classification [4].

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References

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[4] Dubey, Abhimanyu, et al. "Pairwise confusion for fine-grained visual classification." *ECCV*. 2018.