Aspects on *in vivo* imaging techniques for diagnostics of pigmented skin lesions

Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Göteborgs universitet kommer att offentligen försvaras i hörsal Arvid Carlsson, Medicinaregatan 3, Göteborg, fredagen den 26 september 2008 kl 09.00

av

Karin Terstappen (Westerhoff)
leg. läk.

Fakultetsopponent:
Ass professor Guiseppe Argenziano, Second University of Naples, Neapel, Italien

Avhandlingen baseras på följande arbeten:

I. K Westerhoff, W H McCarthy and S W Menzies. Increase in the sensitivity for melanoma diagnosis by primary care physicians using skin surface microscopy. *British Journal of Dermatology 2000; 143: 1016-1020.*

II. S W Menzies, K Westerhoff, H Rabinovitz, A W Kopf, W H McCarthy and B Katz. Surface microscopy of pigmented basal cell carcinoma. *Archives of Dermatology 2000; 136: 1012-1016.*

III. K Terstappen, O Larkö and A-M Wennberg. Pigmented basal cell carcinoma – Comparing the diagnostic methods of SIAscopy and dermoscopy. *Acta Dermato-Venereologica 2007; 87: 238-242.*

IV. K Terstappen, M Suurküla, H Hallberg, M Ericson and A-M Wennberg. Poor correlation between spectrophotometric intracutaneous analysis and histopathology in melanoma and non-melanoma lesions.
Submitted for publication.

Aspects on *in vivo* imaging techniques for diagnostics of pigmented skin lesions

Karin Terstappen (Westerhoff), Department of Dermatology and Venereology, Institute of Clinical Science, The Sahlgrenska Academy, University of Gothenburg, Göteborg, Sweden

Abstract

Problem*:* Non-invasive diagnostic techniques to facilitate diagnosis of pigmented skin lesions (PSL) are being developed. Dermoscopy and SIAscopy are two such techniques, and they are evaluated in this thesis.
Aims*:* Pp I: To investigate if primary care physicians (PCPs) improve their ability to diagnose melanoma using dermoscopy after a short education intervention. Pp II: To describe relevant morphological features of pigmented basal cell carcinomas (BCCs) using dermoscopy and to create a diagnostic method based on these findings. Pp III: To evaluate if SIAscopy could be used to diagnose pigmented BCCs. Pp IV: i) To find out if SIAscopic findings topographically correlated with histopathological findings of melanoma; ii) if SIAscopy could give a topographic indication of the localisation of maximum tumour thickness, iii) provide a guide for appropriate sectioning of the specimen for histopathological evaluation.
Methods*:* Pp I: The diagnostic accuracy for melanoma and non-melanoma PSLs were tested among 74 PCPs, divided into an education intervention group and a control group. Both groups were re-tested after the education intervention. Pp II: 426 dermoscopic images of pigmented BCCs, melanomas and benign PSLs were scored for dermoscopic features. Based on the results an algorithm was derived. Pp III: 21 pigmented BCCs were analysed regarding dermoscopic and SIAscopic findings. Pp IV: 60 PSLs, i.e. 29 invasive melanomas, 13 melanoma *in situ* and 18 benign PSLs, showing positive SIAscopic findings were included. Topographic comparisons were made between SIAscopic findings and histopahology.
Results: Pp I: There was a significant improvement in sensitivity for melanoma diagnosis among PCPs who were educated in dermoscopy. Pp II: A dermoscopic algorithm for diagnosing pigmented BCCs was created. The algorithm had a sensitivity of 93% for the diagnosis of pigmented BCCs, a specificity of 89% for invasive melanoma and 92% for benign pigmented skin lesions. Pp III: The same SIAscopic features that had previously been shown to be frequent in melanomas, were seen in pigmented BCCs. Using dermoscopy 90% of the pigmented BCCs were correctly diagnosed. Pp IV: In only 11 of 29 invasive melanomas the SIAgraphs topographically matched the area of invasion on histology. A high concentration of dermal melanin was the SIAscopic signal with best correlation to melanoma invasion, although it also proved to have low specificity.
Conclusions*:* Pp I: Dermoscopy significantly improves sensitivity for melanoma when used by primary care physicians, after a short education intervention on dermoscopy. Pp II: A robust dermoscopy algorithm that allows the diagnosis of pigmented BCCs from invasive melanoma and benign pigmented skin lesions has been developed. Pp III: SIAscopy has no advantage over dermoscopy when diagnosing pigmented basal cell carcinoma, and can be misleading if the examiner has little or no knowledge of dermoscopy. Pp IV: Information regarding microscopic structure and architecture given by the SIAscope does not represent reliable diagnostic information related to the lesions internal structure, when compared to histopathology. Therefore SIAscopy cannot be used as a guide for localising the maximum tumour thickness when performing histopathological examination.

Key words: Melanoma, pigmented nevi, basal cell carcinoma, differential diagnosis, dermoscopy, spectrophotometric intracutaneous analysis, pathology

ISBN 978-91-628-7547-3