

## Benefits and Risks with Digital Dermoscopy and Teledermoscopy

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Johan Dahlén Gyllencreutz, defended on December 8, 2017 his doctoral thesis “Benefits and Risks with Digital Dermoscopy and Teledermoscopy”. Professor Rainer Hofmann-Wellenhof, Medical University of Graz, Austria acted as Opponent. Main supervisor was Associate Professor John Paoli and co-supervisors were Helena Gonzalez and Karin Terstappen. Doctoral dissertation series, Göteborg. Available from: <https://gupea.ub.gu.se/handle/2077/53617>.

The increasing incidence of malignant melanoma and non-melanoma skin cancer makes it necessary to optimise the management of patients with suspicious skin lesions, from triaging, to establishing a diagnosis and planning treatment. The general aims of this thesis were to investigate the use of teledermoscopy (TDS) as a way of achieving such an optimisation, and to study safety aspects of digital dermoscopy and teledermoscopy.

In study I, smartphone TDS was compared with the paper referrals used in primary health care (PHC) in Sweden. The outcome of 772 patients referred by TDS was compared to that of 746 patients referred without images. With TDS, the management of patients with skin cancer was faster and the triaging of referrals was more accurate.

In study II, 6 dermatologists evaluated 80 TDS referrals and 77 paper referrals, resulting in a moderate interobserver concordance for both referral methods. The diagnostic agreement was generally higher with TDS, with the largest difference seen for melanoma. TDS also made it easier to plan for surgery at the first visit and to resend referrals with clearly benign lesions. However, a few TDS referrals with malignant lesions were incorrectly resent.

In study III, two dermatologists compared the image quality of 172 dermoscopic images acquired in PHC with images of the



Fig. 1. Smartphone used for teledermoscopy.



Johan Dahlén Gyllencreutz (middle) with Professor Rainer Hofmann-Wellenhof (Opponent) and Associate Professor John Paoli (main Supervisor) to the left and Karin Terstappen and Helena Gonzalez (co-supervisors) to the right.

same tumours, obtained at the department of dermatology. The PHC images were of slightly lower quality but the difference was not statistically significant. No difference was found in the ability to correctly diagnose the lesions.

In study IV, dermoscopic images of skin lesions, obtained before and after the use of a sunless tanning product containing dihydroxyacetone (DHA) were compared. For facial lesions, there were significantly more equivocal lesions after the use of DHA. A follicular pigmentation was often found, somewhat mimicking that of lentigo maligna.

In conclusion, TDS can result in safer, more efficient management of patients with skin lesions of concern, earlier treatment of patients with malignant lesions and fewer unnecessary visits for patients with clearly benign lesions. TDS images obtained in PHC are of similar quality to those obtained by trained dermatologists. When triaging TDS referrals, dermatologists should avoid resending referrals for clinically atypical

melanocytic lesions and take into consideration the use of pigment-altering substances such as DHA.

### List of original publications

- I. Börve A, Dahlén Gyllencreutz J, Terstappen K, Johansson Backman E, Aldenbratt A, Danielsson M, et al. Smartphone Teledermoscopy Referrals: A Novel Process for Improved Triage of Skin Cancer Patients. *Acta Derm Venereol* 2015; 95: 186–190.
- II. Dahlén Gyllencreutz J, Paoli J, Bjellerup M, Bucharbajeva Z, Gonzalez H, Nielsen K, et al. Diagnostic agreement and Interobserver Concordance with Teledermoscopy Referrals. *J Eur Acad Dermatol Venereol* 2017; 31: 898–903.
- III. Dahlén Gyllencreutz J, Johansson Backman E, Terstappen K, Paoli J. Teledermoscopy images acquired in primary health care and hospital settings - a comparative study of image quality. *J Eur Acad Dermatol Venereol*. 2017 Aug 29. [Epub ahead of print]
- IV. Dahlén Gyllencreutz J, Bengtsson Boström K, Terstappen K. Does it look like melanoma? A pilot study of the effect of sunless tanning on dermoscopy of pigmented skin lesions. *Br J Dermatol* 2013; 168: 867–870.