

# Selected aspects on improving the management of skin cancer

Akademisk avhandling

som för avläggande av medicine doktorexamen  
vid Sahlgrenska akademien vid Göteborgs Universitet  
kommer att offentligen försvaras i hörsal Arvid Carlsson,  
Academicum, Medicinargatan 3, Göteborg,  
onsdagen den 3 juni 2009 kl. 09.00

av

John Paoli  
Leg. läkare

Fakultetsopponent:

Professor Bernt Lindelöf  
Hudkliniken, Karolinska Universitetssjukhuset Solna

The thesis is based on the following papers:

- I. John Paoli, Maria Smedh, Ann-Marie Wennberg and Marica B. Ericson. Multiphoton Laser Scanning Microscopy on Non-Melanoma Skin Cancer: Morphologic Features for Future Non-Invasive Diagnostics. *J Invest Dermatol* 2008; 128: 1248-55
- II. John Paoli, Annika Ternesten Bratel, Gun-Britt Löwhagen, Bo Stenquist, Ola Forslund and Ann-Marie Wennberg. Penile Intraepithelial Neoplasia: Results of Photodynamic Therapy. *Acta Derm Venereol* 2006; 86: 418-421
- III. John Paoli, Christina Halldin, Marica B. Ericson and Ann-Marie Wennberg. Nerve blocks provide effective pain relief during topical photodynamic therapy for extensive facial actinic keratoses. *Clin Exp Dermatol* 2008; 33: 559-564
- IV. John Paoli, Markus Danielsson and Ann-Marie Wennberg. Results of the "Euromelanoma Day" Screening Campaign in Sweden 2008. Accepted for publication in the *J Eur Acad Dermatol Venereol* (April 6<sup>th</sup>, 2009).

Göteborg 2009



UNIVERSITY OF GOTHENBURG

## **Selected aspects on improving the management of skin cancer**

**John Paoli**

Department of Dermatology and Venereology, Sahlgrenska University Hospital,  
Institute of Clinical Sciences at the Sahlgrenska Academy,  
University of Gothenburg, Gothenburg, Sweden

### **ABSTRACT**

The constant rise of skin cancer incidence rates in Sweden is a problem which requires attention. Improved techniques for prevention, early detection and effective treatment are required to face this challenging task. The studies presented in this thesis deal with selected aspects concerning diagnostic, therapeutic and preventive methods with the aim of improving the management of skin cancer.

The diagnosis of skin cancer today is mainly based on visual examination, dermoscopy and histopathology, but several new imaging techniques are under development. In this thesis, multiphoton laser scanning microscopy (MPLSM) was used to study non-melanoma skin cancers (NMSCs) in comparison to healthy skin *ex vivo*. Typical histopathological criteria were observed on a subcellular level in superficial basal cell carcinomas and squamous cell carcinoma *in situ* lesions. However, the limited imaging depth of approximately 100  $\mu\text{m}$  made imaging of thicker nodular basal cell carcinomas more difficult.

One effective therapeutic option for superficial NMSCs is photodynamic therapy (PDT). It is considered a first-line therapy for extensive areas of actinic keratoses (AKs) and new indications are being evaluated. Penile intraepithelial neoplasia (PIN) lacks effective treatments with low recurrence rates. The effectiveness of PDT in the treatment of PIN was studied. Seven out of ten patients responded to treatment and four showed no recurrences after a mean follow-up of 35 months. Another issue is pain during PDT, a drawback with which physicians have struggled for years. A split-face study on patients with extensive AKs in the facial area showed that nerve blocks provided excellent pain relief during PDT.

Primary and secondary prevention of skin cancer involves campaigns that encourage sensible sun-exposure behaviors and promote skin self-examinations for early detection. As part of this thesis, the results of the 'Euromelanoma Day' screening campaign in Sweden 2008 were compiled. The detection rates of NMSC and malignant melanoma (MM) among the 2659 screened patients were up to 2-3 times higher than similar campaigns in other European countries. The prognosis of the 24 diagnosed MMs was predominantly favorable.

In conclusion, today's diagnostic, therapeutic and preventive measures have room for further development. New non-invasive imaging techniques like MPLSM may lead to bedside histopathological confirmation of a skin cancer diagnosis. PDT may be a therapeutic alternative for PIN and pain during PDT in the facial area can be effectively relieved with nerve blocks. Screening campaigns can obtain high detection rates of skin cancer when directed towards a population with high incidence rates.

*Key words:* Skin cancer, malignant melanoma, squamous cell carcinoma, basal cell carcinoma, multiphoton laser scanning microscopy, penile intraepithelial neoplasia, photodynamic therapy, nerve block, field cancerization, screening, prevention.