Development of a new picture based image-processing program to analyse and categorise peristomal skin

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Introduction

A number of medical diseases e.g. malignancy, Crohn's disease, ulcerativ colititis, and trauma can result in the need for an ostomy. It is very important for the user to keep the peristomal skin (skin surrounding the ostomy) healthy since it plays an important role in the normal use of ostomy appliances, Figure 1. The condition of the skin is also a critical performance measure for the ostomy product range at ColoplastA/S. Currently, the Ostomy Skin Tool (OST) is used to asses and track the condition of the peristomal skin. The OST assessment is based on human visual inspection of the affected area, which is both time consuming and may be prone to bias.

Figure 1 – Ostomy bag used to collect output.

The aim of this project is to research **categorisation of peristomal skin** and possible develop an program to **analyse** it automatically.

Material and Methods

The peristomal skin was photographed using the Samsung EX2F digital camera and a self designed light box, Figure 2A. The light box encloses the peristomal skin ensuring the skin is only illuminated by white diffuse lighting. The exposed area is a circular region with diameter of 13 cm, Figure 2B. Along the rim of the light box a visible end plate is installed with a reference colour chart with 24 calibrated colours. The skin was photographed approximately 10 minutes after removal of the ostomy appliance and cleansing. All users in the study either had a colostomy or an ileostomy.

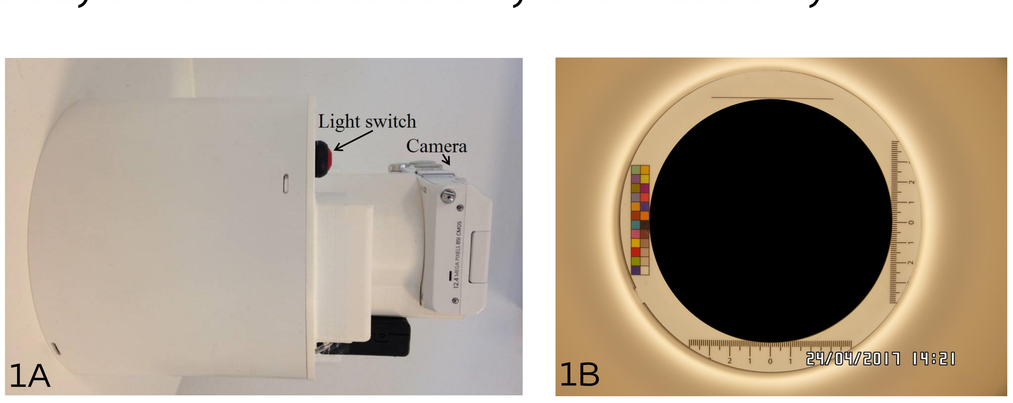

Figure 2 – A) The light box with the camera attached. The left part of the box is placed on the abdomen . B) The image obtained with the light box. The black area illustrates the exposed area.

- Pre-processing and detection

In MATLAB the images were colour corrected using the reference colour chart. Furthermore the non skin area and the ostomy were detected.

- Intensity features

The users' skin were grouped into five types of areas:

- Normal skin
- Hypo pigmented skin
- Hyper pigmented skin
- Eroded/red skin
- Pink skin

Mean R, G, and B intensities for all areas were collected.

Results

The users' skin was pre-processed and the peristomal skin area was detected and analyzed, Figure 3.

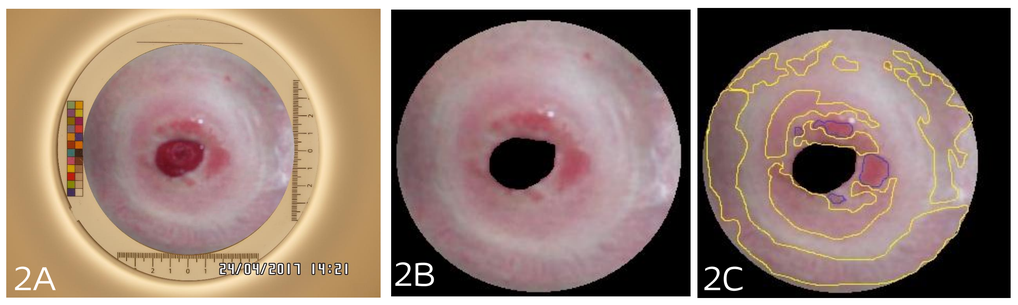

Figure 3 – A) Original image photographed with the light box. B) The peristomal skin after pre-processing and detection of the ostomy and non skin area. C) The peristomal skin divided in types of areas. Blue, and yellow illustrate eroded/red, and hyper pigmented skin, respectively. The non-marked area is labelled as normal skin.

Results show correlation between the types of areas across users. This indicates that segmenting different skin area types based on their R, G and B intensities is feasible.

Conclusion and future studies

From the study it can be concluded that the five skin types can be distinguished based on intensity features. Furthermore, correlation was found between the types of areas across users.

The next stage in this study is to apply machine learning methods in order to classify peristomal skin types. After this the user's skin should be categorized based on the severity of the skin e.g. depending on the size, and severity of the respective skin area types. Additionally, investigate the structures of the peristomal skin, i.e. the texture, as that might contain valuable information.