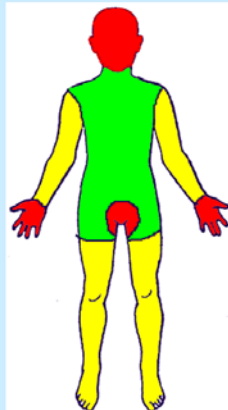# "Combining Severity and Socio-Emotional Impact for the Psoriasis Evaluation"

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ABSTRACT: We defined a global score for the evaluation of psoriasis that combines the severity measured by the PASI score with the socio-emotional impact of the disease. We compute the new score by correlating the severity parameters of the PASI score (area, redness, scaliness and thickness) with the location of the psoriatic region. Consequently, we obtain a higher-level relevance score—from the point of view of the psychological impact of the disease on the patient—that is able to provide a complete picture for the disease evaluation.
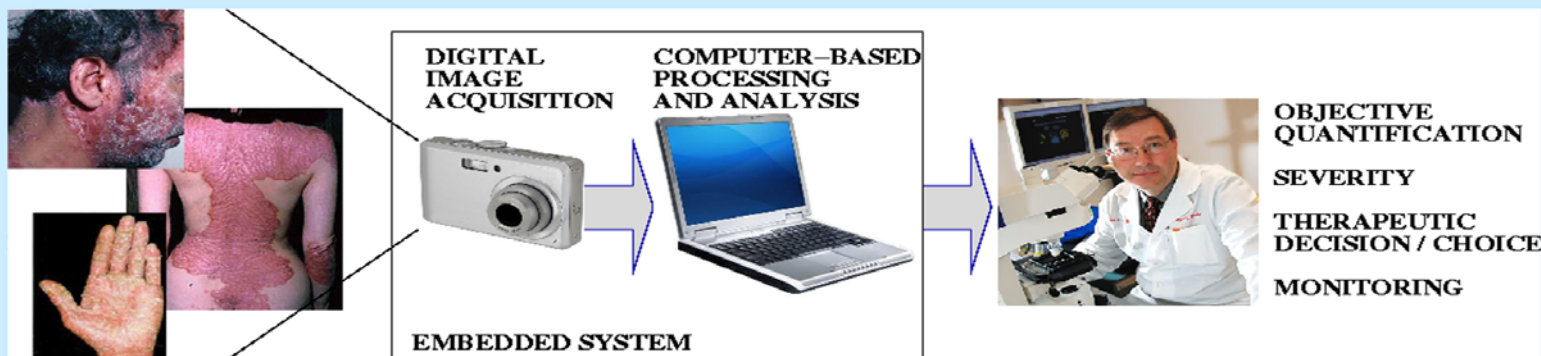
- We defined 3 regions, corresponding to the degree of socio-emotional (SE) impact and 3 intervals for the score values:
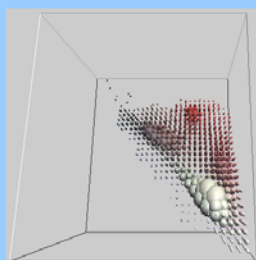
HIGH SE IMPACT	score = (2 – 3]
MEDIUM SE IMPACT	score = (1 – 2]
LOW SE IMPACT	score = [0 – 1]

- The values are directly proportional to the severity – the maximum value of each interval indicating maximum area (A_{max}), erythema (E_{max}), scaliness (S_{max}), thickness (T_{max}).

- The corresponding degrees of inconvenience are as 3, 2 and 1 respectively. In this way, for two similar lesions (same affected area, same redness, scaliness and thickness) the formula we propose gives larger values for region 1, than for region 2 or 3, reflecting the fact that the patient is more socially and emotionally affected if the lesion is situated in region 1 than in region 3 (e.g. the patient is more socially and emotionally affected if the same lesion is located on the face than on the leg).

$$score = \begin{cases} \sum_{k=1}^{N} \dfrac{(A \cdot E \cdot S \cdot T)_k}{A_{max} \cdot E_{max} \cdot S_{max} \cdot T_{max}}, & green \\[2ex] 1 + \sum_{k=1}^{N} \dfrac{(A \cdot E \cdot S \cdot T)_k}{A_{max} \cdot E_{max} \cdot S_{max} \cdot T_{max}}, & yellow \\[2ex] 2 + \sum_{k=1}^{N} \dfrac{(A \cdot E \cdot S \cdot T)_k}{A_{max} \cdot E_{max} \cdot S_{max} \cdot T_{max}}, & red \end{cases}$$
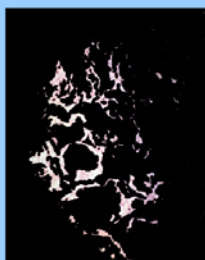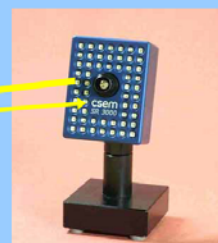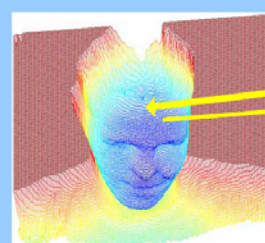

DIGITAL IMAGE ACQUISITION → COMPUTER–BASED PROCESSING AND ANALYSIS → OBJECTIVE QUANTIFICATION

SEVERITY

THERAPEUTIC DECISION / CHOICE

MONITORING

EMBEDDED SYSTEM

Original Image — **Color distribution in a 3D space** — **Erythema** — **Scaliness**

Using digital image techniques, the colors are classified (fuzzy C-means clustering algorithm) and the areas of interest are quantified

- The "red" pixels indicate the erythema
- The "white" pixels indicate the scaliness
- The total number of red and white pixels = lesion area

The automatic assessment tool we develop is very useful for creating and maintaining a complete electronic record of the patient, to evaluate the response to the treatment both in every day clinical practice and in the new therapy studies.

We are currently investigating the possibility of measuring the thickness of the lesions by using a Time of Flight (ToF) camera.

- The new PASI-like score is meaningful because is able to capture the localization of the lesions as well as the socio-emotional implications

- The therapy choice is usually made based on the localization of the lesion, rather than the the value of the classic PASI score