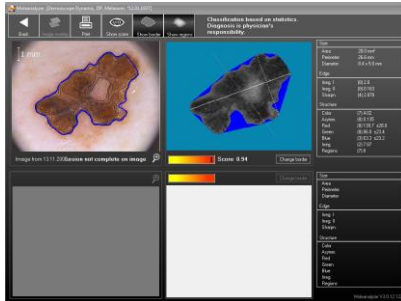


Mole**analyzer** 3.0.

A diagnostic aid for the early detection of malignant melanoma

Theoretical concept



The Mole**analyzer** has been developed by the Dermatology Department of the University of Tuebingen in Germany with two objectives in mind:

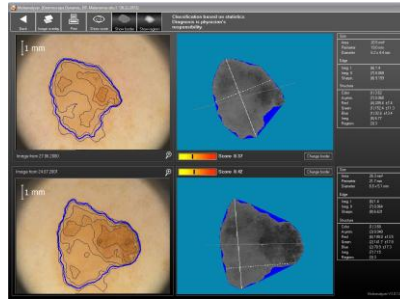
1. Exact comparison of two images of a pigmented lesion which were taken over the time.
2. Better distinction between benign and malignant melanocytic skin changes by using computer-aided algorithms.

When the program was developed, a conscious effort was made not to use one of the prevalent theories on sample recognition or diagnostic classification (e.g. the ABCD rule, the 7-point checklist). The objective was to develop a uniquely computer-specific method of establishing diagnostic findings.

Most of the algorithms used for the project had been developed during military air reconnaissance missions. Tests were carried out to determine which characteristics contribute most to the distinction between benign and malignant lesions.

The Mole**analyzer** can analyze one dermoscopic image or two follow-up pictures in parallel. The program is suited for melanocytic lesions only; the analysis of e.g. seborrheic keratoses may result in a wrong classification.

Analysis procedure

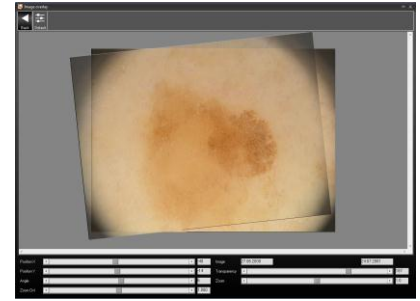


1. Elimination of disruptive structures like hairs and blisters.
2. Demarcation of the lesion's border.
3. Determination of the longest and the largest diameter at an angle of 90°, and the axis of symmetry. It also calculates the lesion's surface area and circumference.
4. Assessment of the lesion with regard to its regularity, how much it deviates from the smoothest borders and its acuteness.
5. Assessment of the lesion's structural characteristics and colors.
6. The symmetry of the lesion is also assessed, as well as its entropy and the areas.

Based on diagnostic algorithms, the lesion is evaluated with a malignancy score between 0 and 1. To better visualize the result, it can be shown upon request on a color scale.

White represents the typical, regular melanocytic nevi. However, note that melanoma exist which do not look like melanoma! **Yellow** represents the somewhat atypical, dysplastic melanocytic nevi, which should be re-examined after 3 to 6 months. **Red**: When a lesion is classified in the red area, the mole is a highly dysplastic nevus which has a probability of being a malignant melanoma.

Diagnostic accuracy



By superimposing the images, the change of the lesion demonstrated impressively.

The program has a diagnostic sensitivity of 86% and a diagnostic specificity of 83%. The available values could not be more accurate if they were determined by an experienced dermatologist in practice.

The program should be used above all for assessing particularly unusual melanocytic lesions. In such cases the dermatologist receives an independent computerized second opinion based on image analysis algorithms which are not covered by the prevalent dermoscopy algorithms.

The results shown on the screen can be used by the dermatologist as means of communication with his patient. The experiences prove that patients feel more secure when this program is used.

The experienced dermatologist will use the Mole**analyzer** as an additional diagnostic tool. No more significance should be attached to the program than to clinical and dermoscopic diagnosis. The use of all diagnostic methods together will result in an overall improvement of diagnostic accuracy.