Synopsis of Original Research Paper

Basic research for the development of automatic image analysis system on skin pigmentation due to ageing

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A computer assisted area of involvement measurement of skin lesions would be useful for the assessment of psoriatic patients. It is, however, sometimes difficult when lesions cannot simply be separated using the normal threshold tool of an image analyser. Because of the body curvature, the peripheral site of the body is usually shaded and the central site has glare. Shade correction is usually performed by use of the brightest point or the darkest point choosing programs in the small kernel basis. However, when the objectives are large such as psoriatic lesions, the procedure will have to be repeated several times. To avoid this repetition and to obtain a well fit curved line to account for the body curvature induced glare and shadow, we have devised a simple C-program for averaging from linear neighbouring pixels.

We used an Optomax V image analysis system and Image Pro Plus. An image from a patient with psoriasis was captured from a colour slide through a video camera attached to the system. Turbo C++ Ver 1.01 (Borland) was used for programming and compiling. First, 49 pixel moving point average was programmed. The image data were read line by line and the new grey level data for the averaged image were calculated. Secondly, the program written above was developed into the program for n pixels ($3<n<499$, n; odd number).

Execution of the pixel averaging program with the original image resulted in the background brightness image file. When this was subtracted from the original image, Optomax produced an image which was easily detected using the standard thresholding tool and the percentage of area involved was calculated.

The pixel averaging was used in this study, because the size of the lesions was relatively small. If the plaque of the psoriatic lesion is very large, planimetry might be a better method. These methods are accurate enough to measure the area of lesions for assessment of disease severity.

We further applied the method to measure skin lesions in patients with pemphigus. The programs were run with images and the processed images were analyzed with an image analyzer, Image Pro Plus. The processed images were compared with the original images and shown to correspond to most of the lesions, which included blisters, erosions and erythemata. It was more difficult in pemphigus than in psoriasis, because the lesions in the former consist of new and old skin lesions and of more polymorphous lesions. Although there still are some difficulties in detecting polymorphous lesions, this method would be a useful and powerful tool when considering the statistical relationship, for example, between severity and ELISA titers for Desmogleins 1 and 3.