Automated Detection of Macular Changes in Dry AMD Using the RetMarker

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Purpose

To automatically earmark changes on a time sequence of color fundus photographs and to allow the follow-up of individual retinal changes selected manually.

Methods

Digital color fundus photographs (30º fov, 1594 x 1326 pixels) were taken every 6 months during a 2 year follow-up period, from a set of 62 fellow eyes of 62 patients with unilateral CNV. Images were converted to grayscale through principal component analysis (PCA), processed to correct for non-uniform illumination and co-registered to the respective baseline image (fully automated tasks). Image-differences (changes) are computed for every image-visit to baseline. From the 62 image sequences, 3 sequences (eyes) could not be processed because of the image quality. From the remaining 59 eyes, 16 converted to wet-AMD and 43 remained in the dry-form until the last visit.

Results

A fully automated procedure was developed to map changes detected over a time-sequence of color fundus images. 56% (9 out of 16) CNV converter eyes were shown to have retinal changes detected by the RetMarker prior to conversion. On the other hand, 14% (6 out of 43) presented similar changes but did not convert until the end of the 2 year follow-period. Only 5% (3 out of 62) cases could not be processed by the system.

Conclusions

Changes automatically detected in color fundus images were successfully earmarked, despite different image conditions. The developed color scheme allows the identification of the location, in the time-sequence, of the earmarked changes, as well as the areas where previous changes returned to the baseline status. RetMarker appears to be able to identify drusen changes over time in successive visits. The occurrence of these changes show drusen activity, and appear to indicate conversion of dry AMD to wet AMD.

References

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