Normalization of Time Domain-Optical Coherence Tomography (TD-OCT) Retinal Nerve Fiber Layer Thickness Measurements

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Technology description

Background

Optical coherence tomography is a low-coherence, interferometer-based, noninvasive medical imaging modality that can provide non-contact, real-time, high-resolution, cross-sectional images of biological tissue. TD-OCT (time domain OCT) has been widely accepted to quantitatively assess the Retinal Nerve Fiber Layer (RNFL) which is advantageous in the diagnosis and monitoring of the progression of glaucoma, the second leading cause of blindness worldwide. Previous studies have shown that structual changes of both RNFL thickness and ONH shape can be early indicators for glaucomatous abnormality. Many times glaucomatous progression by Visual Field (VF) is detected only after significant RNFL loss has already occurred. RNFL measurements using repeated OCT scans at different time points (months or years) are needed to detect glaucoma progression, which can appear earier than VF changes. Technology The goal of the subject invention is to normalize the Retinal Nerve Fiber Layer (RNFL) thickness measurements of off-centered TD-OCT circle scans to a universal (virtual) location centered on the Optic Nerve Head (ONH) of the same eye. Both a mathematical model of the retinal tissue pattern and a scan location matching (SLM) algorithm. (ID01633, PCT/US2009/052951) are used for this calculation. Using the normalized RNFL thickness measurements avoids the previous downfall of RNFL thickness measurement variability. This makes it possible for clinicians to track, compare, and detect any retinal changes over a longer period of time (independent of imaging modality i.e. TD-OCTor SD-OCT). There is currently no technology / methodology to provide backward compatibility between two-dimensional (2D) TD-OCT scans and three-dimensional (3D) SD-OCT volumetric data.

Application area

Allows clinicians to track, compare and detect retinal changes over a longer period of time

Advantages

1. RNFL thickness measurement normalization of off-centered TD-OCT circle scans to a universal (virtual) location centered on the ONH. 2. Mathematical model of the retinal tissue pattern by using 3D SD-OCT volume. 3. Improved Reproducibility of TD-OCT scan.

Institution

University of Pittsburgh

Inventors

Hiroshi Ishikawa

联系我们

叶先生

电话：021-65679356
手机：13414935137
邮箱：yeyingsheng@zf-ym.com