Introduction

Objective and rationale of study

The development of an imaging modality capable of observing response dynamics across the retina of the living subject in the context of systemic disease is of great interest. Noninvasive, minimally invasive, and highly sensitive techniques to observe retinal microvasculature have been successfully applied to the study of diabetic retinopathy [1]. This work builds on prior investigations of retinal microvasculature response [2] and extends those observations to measure and report on the biochemical changes associated with diabetes.

Objectives

The primary study objectives are to quantitatively assess the impact of diabetes on the retinal microvasculature using noninvasive and minimally invasive techniques. The study further examines the impact of diabetes on the retinal microvasculature in response to peripherally induced metabolic challenges. The study assesses the potential of this approach for identifying early signs of diabetes.

Methods

Study design

A cross-sectional study was conducted to enroll subjects with diabetes and control subjects who were matched for age, gender, and body mass index. Subjects were recruited from the local population and were screened for eligibility based on inclusion and exclusion criteria. Eligible subjects were randomized to receive treatment or observation, with a follow-up visit scheduled for four weeks.

Outcome measures

The primary outcome measure was the spatiotemporal dynamics of retinal microvascular response to metabolic challenges. Secondary outcomes included the impact of diabetes on retinal microvascular architecture, blood flow, and oxygenation.

Results

The study enrolled 50 subjects, 25 with diabetes and 25 matched controls. The results showed significant differences in spatiotemporal dynamics of retinal microvascular response between diabetic and control subjects. In diabetic subjects, there was a decrease in the magnitude of response and a delay in the onset of response compared to control subjects.

Conclusions

The results of this study suggest that noninvasive and minimally invasive techniques can be used to assess the impact of diabetes on retinal microvasculature. Further studies are needed to validate these findings and to determine the clinical utility of this approach in detecting early signs of diabetes.