

Early detection of diabetic retinopathy in older adults: Evidence from preventing vision loss through modern screening methods

Diana Saburova: Dr. Jutta Heller TBIOMD 492

## Abstract

Diabetic retinopathy is one of the leading causes of preventable vision loss worldwide, particularly among older people with long-term diabetes. Because retinal damage often develops before visible clinical symptoms appear, improving early diagnosis is critical to preventing irreversible vision loss. This literature review evaluates the available evidence on early diagnostic strategies for diabetic retinopathy in older adults, with a focus on structural and functional retinal biomarkers, advanced imaging technologies, and AI-based screening methods. The analysis summarizes the results of peer-reviewed studies examining several diagnostic methods used to detect early retinal changes. These include optical coherence tomography (OCT), a non-invasive imaging technique that produces high-resolution cross-sectional images of retinal layers and identifies subtle structural abnormalities such as retinal thinning and early microvascular changes. The research also examines multifocal electroretinography (mfERG), which measures localized electrical responses throughout the retina and may detect neural dysfunction before visible vascular lesions develop. Another important approach is microperimetry, a functional test that assesses the sensitivity of the retina in various areas and identifies early visual impairment associated with diabetic retinal damage. Additionally, teleophthalmology programs acquire retinal images in primary care or outpatient settings and transmit them for remote evaluation, often using automated or AI-based image analysis systems to help identify disease-related changes. Overall, the literature shows that early neurovascular changes can be detected before the appearance of clinically visible retinal lesions. These findings suggest that integrating advanced imaging techniques with AI-based screening programs can improve early diagnosis, expand access to screening, and support timely intervention.