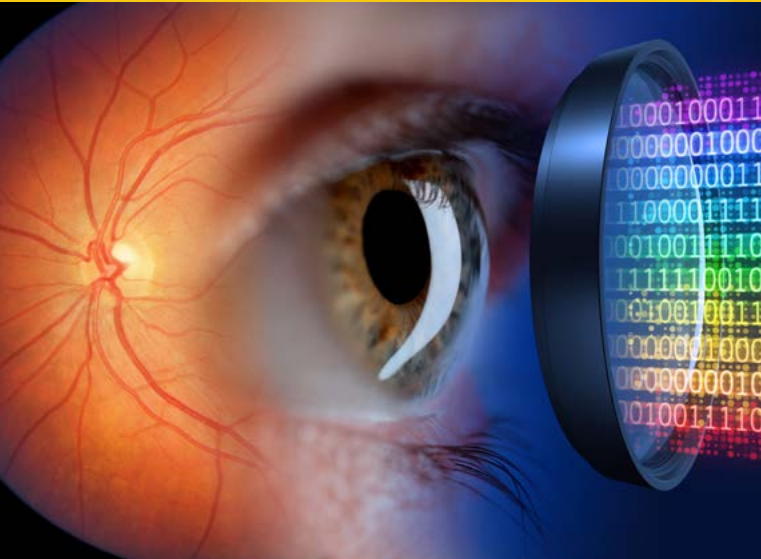


# Quantitative Retinal Imaging



The eye is the only location in the human body where you have direct visual access to both neural and vascular structures. For the measurement of retinal biomarkers TNO developed an innovative quantitative retinal imaging system.

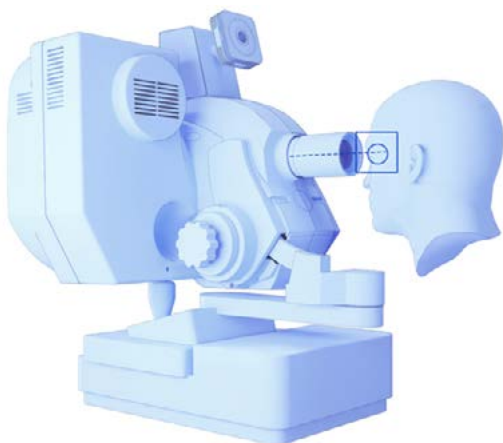
The system is intended for the improved and earlier diagnosis of eye diseases, and we may discover that optical biomarkers relate to diseases such as Alzheimer's and Parkinson's and cardiovascular conditions as well.

## Measuring optical biomarkers in the retina

TNO has expertise to develop new retinal imaging devices for the measurement of optical biomarkers in the retina.

Parameters that TNO is investigating are, e.g.:

- Retinal spatial distribution of hemoglobin-bound oxygen: StO<sub>2</sub>
- Spatial carotenoid concentration maps
- Tissue ultrastructure maps



QRI device



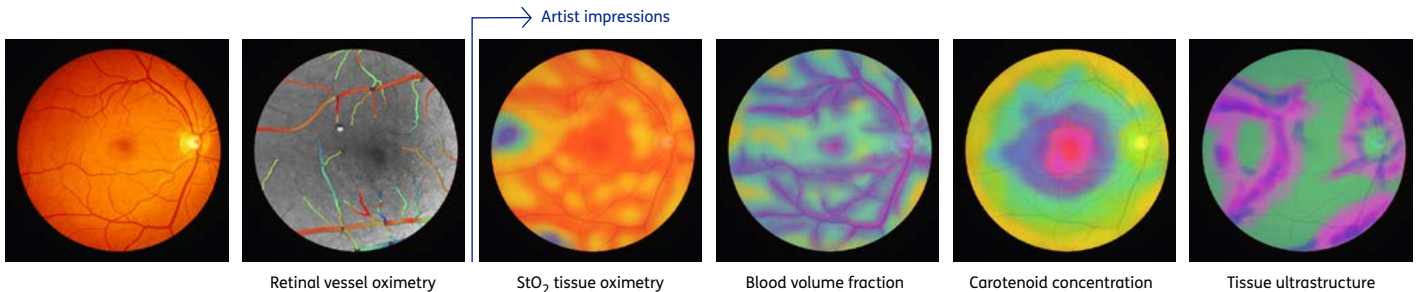
**Adding functionality to retinal imaging**

TNO has patented several methods to optically measure biomarkers in the retina. One of these methods is called “multi-color spatial frequency domain imaging (MC-SFDI)” which is used to quantitatively image optical tissue biomarkers.

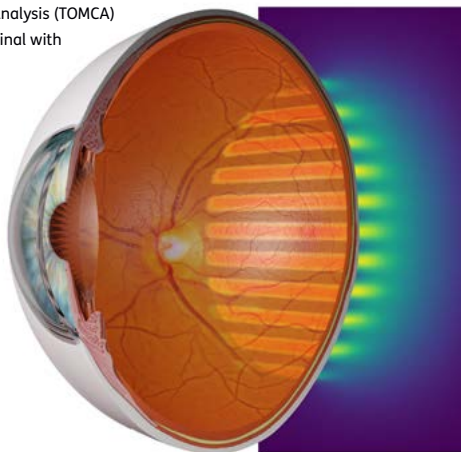
This method uses the projection of patterns with several spatial frequencies and at multiple specific wavelengths to extract the optical tissue biomarker maps from the retina.

By means of Tissue Optical Monte Carlo Analysis (TOMCA) the photon trajectories through the retinal structures are analyzed in order to develop SFDI algorithms that relate measured spatial intensities to biomarker maps.

In-house developed optical retinal tissue phantoms (Model Eyes) are used to validate the different methods.



Tissue Optical Monte Carlo Analysis (TOMCA) of the illumination of the retinal with a line pattern.



TNO is open for additional collaborations on these topics.

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