



Basic principle

Static vessel analysis is an innovative method for non-invasive examination of the state of vessels, based on individual images of the retina. For this purpose, the retinal vessels are first recorded using a fundus camera, and vessel parameters are determined and analysed. These parameters are valid biomarkers that can be used as risk factors or prognosis indicators for vascular diseases and vascular events in the eye and other organs. Static vessel analysis is therefore ideal for use in clinical routine and provides important information about the individual risk of patients, e.g. for assessing

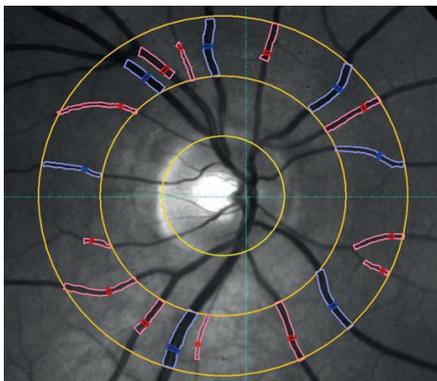
- The risk of cardiovascular diseases and events such as heart attack or stroke
- The risk of diabetes mellitus and obesity
- The risk of vascular occlusion
- Changes following an improvement in the patient's lifestyle

Changes in vascular parameters between the individual examinations provide additional information about disease progression and treatment effects, such as diabetic retinopathy follow-ups or blood pressure adjustments.

The Imedos system provides you with a complete solution including a fundus camera, which automatically transfers the fundus images to the analysis software. Here, the powerful VesselMap solution is used, which supports the examination protocol according to ARIC (Atherosclerosis Risk in Communities Study) with extended statements, model ideas and procedures.



Image of retinal vessels



Static vessel analysis according to the ARIC study protocol

Performing the static vessel analysis using the VesselMap analysis software from Imedos

1. At least one standardised image of the retina is taken with the imaging system. For the recording, any imaging system validated for static vessel analysis by Imedos is suitable.
2. The digitised retinal image is evaluated using ring-shaped markers centred on the position of the optic disc. The measurement range is between the second and third ring.
3. Subsequently, all arterial and venous vessels with a diameter of more than 40 μm in this measurement range are marked once by the user.
4. The software then automatically determines a vessel diameter averaged over the location for each contiguous vessel section in the measurement range.
5. In the last step, the vessel parameters are automatically calculated according to the formulas described by Hubbard* for the ARIC protocol.

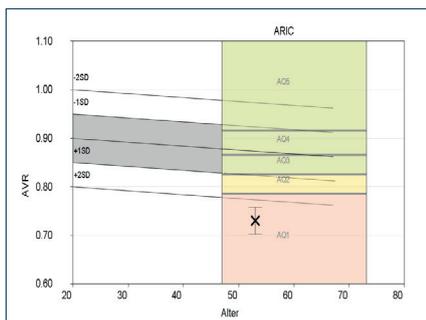
*Hubbard, Larry D., et al. Methods for evaluation of retinal microvascular abnormalities associated with hypertension/sclerosis in the Atherosclerosis Risk in Communities Study. *Ophthalmology* 106.12 (1999): 2269-2280.

The parameters of static vessel analysis

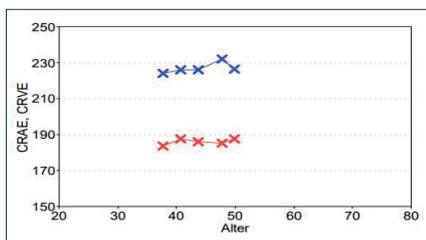
- **Central retinal arteriolar equivalent (CRAE):**
Arterial model vessel diameter
- **Central retinal venular equivalent (CRVE):**
Venous model vessel diameter
- **Arteriolar-to-venular ratio (AVR):**
The CRAE/CRVE ratio

The central equivalents CRAE and CRVE describe model vessel diameters for characterising the central vessels. These model vessel diameters take into account all arterial and venous vessels carrying blood to and from the retina, according to a geometric haemodynamic weighting.

In the initial examination, it is necessary to manually mark the vessel sections and assign the type of vessel, artery or vein. Advantageously, the images in follow-up examinations can be evaluated automatically on the basis of the initial examination.



Extract from the examination protocol of static vessel analysis



Graph of static model vessel parameters

The examination protocol of static vessel analysis

In the examination protocol of the VesselMap analysis software, the results for the vascular parameters are colour-coded and the areas of the AVR are assigned to the microvascular risk:

- **Green area:** healthy vessels, inconspicuous vascular condition
- **Yellow area:** borderline value range
- **Red area:** range of values with increased cardiovascular risk according to ARIC

The vascular parameters of static vessel analysis offer a unique first-level screening tool for quick, easy and accurate assessment of vascular conditions. Thus, they define an important component of holistic vascular diagnostics for optimised counselling, treatment, therapy control and risk stratification of your patients.

Please contact us for more information!

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