Talkingeyes®- an ISO certified telemedical eye examination network as an effective tool for data collection in clinical research

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The Eye –
# Gateway to medical insight

Ophthalmological diagnostic imaging provides a wide range of insight into the course of ophthalmological, internistic and neurological diseases.

Microangiopathic retinal abnormalities correlate with cerebro-cardiovascular risk factors as well as neurodegenerative disorders, such as:

- Metabolic syndrome [1]
- Cardiovascular diseases [2]
- Age & arterial hypertension [3]
- Stroke [4, 5]
- Myocardial infarction [6]
- Alzheimer Disease [7]

ONA = Optic nerve atrophy
AVN = Arteriovenous nicking
GAN = Generalized arteriolar narrowing
FAN = Focal arteriolar narrowing
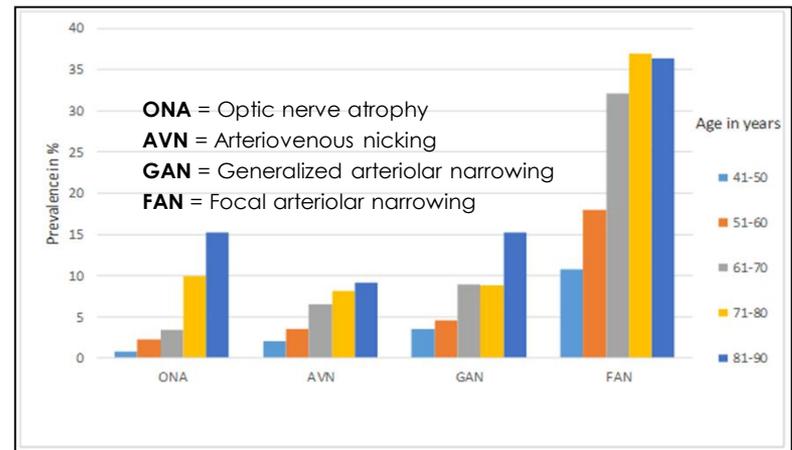
Impact of age on retinal microangiopathic abnormalities **in healthy subjects:** [8,9,10,11,12]

- Prevalences significantly age-dependent
- Focal arteriolar narrowing (R^2 = 0.963; p = 0.035)
- Generalized arteriolar narrowing (R^2 = 0.863; p = 0.025)
- Arteriovenous nicking (R^2 = 0.983; p = 0.017)
- Optic nerve atrophy (R^2 = 0.983; p = 0.017)

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4. Tien Yin Wong et al., Retinal microvascular abnormalities and incident stroke: the Atherosclerosis Risk in Communities Study. **Lancet, 1134-1140, 2001**
5. Kobayashi S et al: Subcortical silent brain infarction as a risk factor for clinical stroke. **Stroke 28:1932–9, 1997**
6. Wong TY, Klein R, Nieto FJ, et al. Retinal microvascular abnormalities and ten-year cardiovascular mortality: a population-based case control study. **Ophthalmology 2003; 110: 933–40**
7. Paquet C et al., Abnormal retinal thickness in patients with mild cognitive impairment and Alzheimer's disease. **Neurosci Lett. 2007;420(2):97-9**
8. **Michelson G et al.,** Validation of telemedical fundus images from patients with retinopathy. Klin Monbl Augenheilkd. **2011 Mar;228(3):234-8.**
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10. Adler W et al., Prevalence of glaucomatous optic nerve atrophy among a working population in Germany diagnosed by a telemedical approach. **Klin Monbl Augenheilkd. 2010 Nov;227(11):905-11.**
11. **Michelson G,** TalkingEyes-and-more. **Biomed Tech (Berl). 2005 Jul-Aug;50(7-8):218-26.**
12. **Michelson G** et al., Telemedical-supported screening of retinal vessels ("talking eyes"). **Klin Monbl Augenheilkd. 2005 Apr;222(4):319-25.**

What is **Talkingeyes®?**

Talkingeyes® is a large, established telemedical eye examination network using ophthalmological diagnostic methods:

- More than 32 participating private practices (GPs and ophthalmologists)
- More than 72,000 evaluated patients (since 2009)
- ISO certified (ISO 9001:2008) as an interdisciplinary tool in the prevention and early detection of hypertension-related and diabetes-related organ damage.
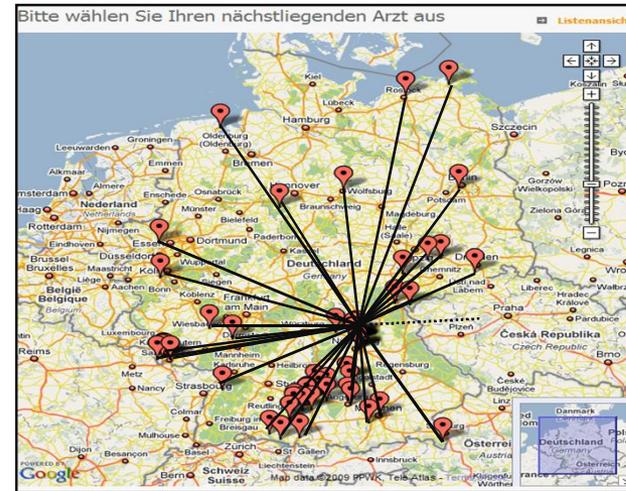
Received numerous awards, such as:

- Erlanger Medizintechnik Award 2007
- Innovationspreis eHealth 2008
- Karl-Storz-Telemedizin Award 2012
- Bayerischer Telemedizin Award 2015

Talkingeyes® -
Data retrieval and evaluation

Talkingeyes® allows for standardized retinal and anterior segment diagnostic imaging.

- Currently used technologies:
  - Optical coherence tomography (OCT)
  - Fundus color photography for posterior pole imaging
  - Corneal and anterior segment diagnostic imaging methods

- Data are obtained in a *standardized* manner and uploaded on a server using web-based software (MedStage®).

- Central evaluation by an experienced ophthalmologist using a *standardized* protocol with defined clinical criteria within three working days.
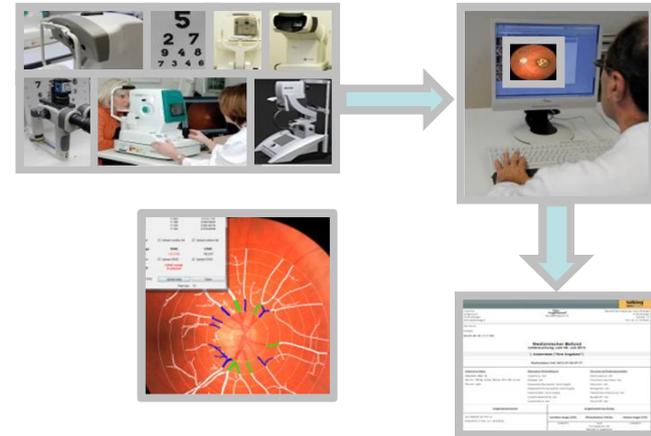
Data retrieval using MedStage® software (Source: TalkingEyes®)
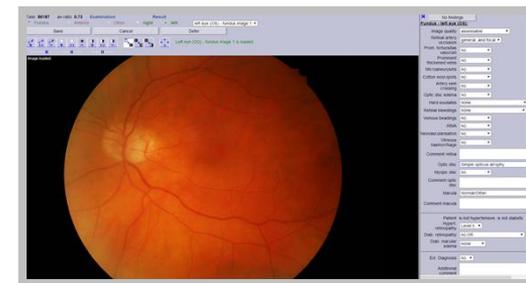
Fundus color photography
(Source: TalkingEyes®)

Potential of **Talkingeyes®** in clinical research

Great potential for **standardized data collection and evaluation** in clinical research:

- – Epidemiological and observational clinical studies
- – Clinical trials

Wide applicability for **early detection and follow-up** of many diseases

- – Ophthalmology (e.g., age-related macular degeneration, glaucoma, diabetic retinopathy and macular edema)
- – Internal medicine/Neurology: Detection of retinal microangiopathic and neuronal abnormalities provides information about neurodegeneration in its earliest stages (e.g., arterial hypertension, diabetes, Parkinson's disease, Alzheimer's disease, Multiple sclerosis)

Cotton-wool spots (correlate for microangiopathic changes)

(Source: Atlas of Ophthalmology, www.atlasophthalmology.com

Proliferative diabetic retinopathy

Source: Atlas of Ophthalmology, www.atlasophthalmology.com

Talkingeyes®
provides a powerful telemedical resource for fast and effective performance of clinical trials on ophthalmological as well as non-ophthalmological disorders.