



# Automated Acquisition and Automated Diagnosis of Diabetic Retinopathy.

## DIABETIC RETINOPATHY

In Mexico, every hour one diabetic goes blind. This blindness is avoidable. The diabetic retinopathy as sequelae of diabetes often leads to blindness when not recognized and treated early.

Diabetic retinopathy occurs worldwide with increasing frequency. It is progressively taking on the character of a common disease. Its early recognition and treatment are becoming an important emphasis in the global healthcare.

Unrecognized and untreated, diabetic retinopathy can lead to blindness, which severely restricts the lives of those afflicted and incurs high financial burdens.

## PRODUCT DESCRIPTION

With Voigtmann GmbH's "Integrated Tele-Ophthalmological System ITOS", mass screenings for the early recognition of diabetic retinopathy can be automated.

ITOS is a cost-efficient and effective procedure, which can be carried out without the involvement of medical professionals. In distributed screening stations, the fundus photographs of patients are acquired and analysed automatically.

When indications of diabetic retinopathy are found, the patient is referred to an ophthalmologic centre. This allows for decentral identification of the few patients in need of ophthalmological treatment out of a much larger risk group.



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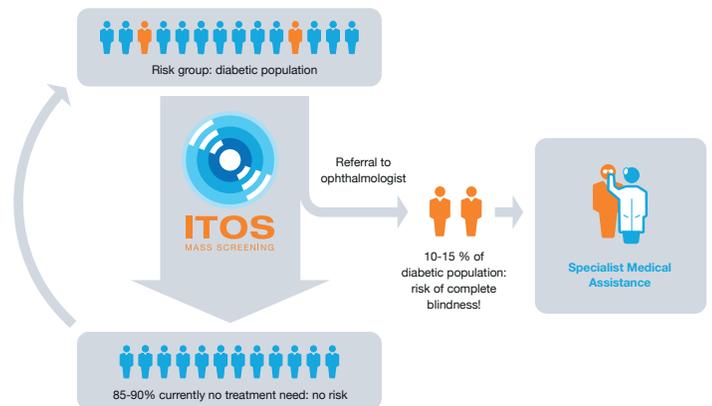
# Mass screening of risk patients without the involvement of medical professionals.

## 25 000 PATIENTS PER YEAR

With one system, about 100 to 120 patients can be examined per day, amounting to approximately 25,000 examinations per year.

ITOS screening stations can be installed everywhere at the same time. Even a decentral operation at widespread, distributed locations in remote areas is possible. This offers the chance to reach high-risk patients with no or only insufficient access to medical care and provide them with adequate ophthalmological treatment.

Conventional screening procedures with specialists or especially trained “graders” evaluating the fundus images for symptoms of a disease are limited for mass screenings as they require a high level of staffing and specialist qualifications.



*Schematic of the process of mass screening with ITOS: In decentral screening stations occupied with non-medical personnel, the patients of a risk group who require medical treatment are identified. Only these are then forwarded to an ophthalmologic centre.*

## ITOS APPLICATION SOFTWARE SYSTEM

The screening stations are equipped with the ITOS application software system. It comprises components for patient management, fundus imaging and the automated analysis of fundus images.

The acquisition and storage of the fundus images are managed by the ITOS application software system. The analysis of images comprehends two steps. In a first step, the image quality of the fundus image is evaluated. If the image quality is sufficient, the second step is carried out. It includes the identification of features in the fundus image, which point to diabetic retinopathy. For this purpose, a special algorithm is used.

## COMPANY PROFILE

The German company Voigtmann GmbH develops and markets complete solutions and services for mass screenings in the field of ophthalmology, especially for the automated early recognition of diabetic retinopathy.

Founded in 2005, Voigtmann GmbH is an owner-run, medium-size, ISO 9001 and ISO 13485 certified IT system house that develops and operates individual software and IT solutions. From 2010 on, two ophthalmology projects within the BMBF Federal Ministry of Education and Research cluster of excellence were the focus of development in close collaboration with institutes of the University Erlangen-Nuremberg and further partners. Results are various patent applications and the basis for the development of the “Integrated Tele-Ophthalmological System ITOS”.

### CONTACT

Voigtmann GmbH  
Germany

Ulmenstraße 52g  
D 90443 Nuremberg

T +49 911 4777 650  
F +49 911 4777 6549

www.itos.voigtmann.com  
itos@voigtmann.com

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**voigtmann**  
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