



## **EYESI INDIRECT OPHTHALMOSCOPE** Training simulator for retinal examinations

Look closer. See further.

 **HAAG-STREIT**  
SIMULATION

# Eyesi Indirect

## High fidelity simulator for training of indirect ophthalmoscopy

Eyesi Indirect is an augmented reality simulator for training of binocular indirect ophthalmoscopy. A comprehensive database of virtual patients presenting with clinically relevant pathologies significantly extends the range of diagnostic training available to ophthalmology and optometry programs today.

### PROCEDURAL AND DIAGNOSTIC TRAINING

## Expertise comes from experience

Indirect ophthalmoscopy is challenging to master, as it requires fine motor skills and the ability to interpret an inverted retina image. The Eyesi Indirect simulator allows for a lifelike training of device handling by mimicking all features of a real indirect ophthalmoscope. In addition to training examination techniques, Eyesi Indirect provides trainees with the medical experience needed to reliably identify pathological findings.

### PATIENTS OF VARYING AGE AND ETHNICITY

## Case database

The database of Eyesi Indirect contains a broad range of clinical cases. The virtual patients have been modeled based on real patient cases in close cooperation with university eye clinics. With a didactically structured curriculum for self-guided training and objective assessment and feedback, Eyesi Indirect allows trainees to become experienced – before they examine their first real patient.



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## Lifelike training environment

With a patient model head, two lenses, and a head-mounted stereo display on an ophthalmoscope headband, the Eyesi Indirect simulator mimics all features of a real binocular indirect ophthalmoscope. When trainees put on the ophthalmoscope hat, they see a dynamic 3D simulation of a patient. To examine the patient's retina, the lens has to be positioned correctly in front of the patient model head.

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## Standardized curriculum for self-guided learning

The case database of Eyesi Indirect presents a range of clinically relevant variations of the retina. The embedded, didactically structured curriculum offers a standardized method for self-guided training.

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## Evidence-based assessment

Eyesi Indirect provides both trainees and educators with an objective performance assessment. Guidance elements and immediate feedback after each case help trainees to improve their skills systematically.

## Lifelike environment

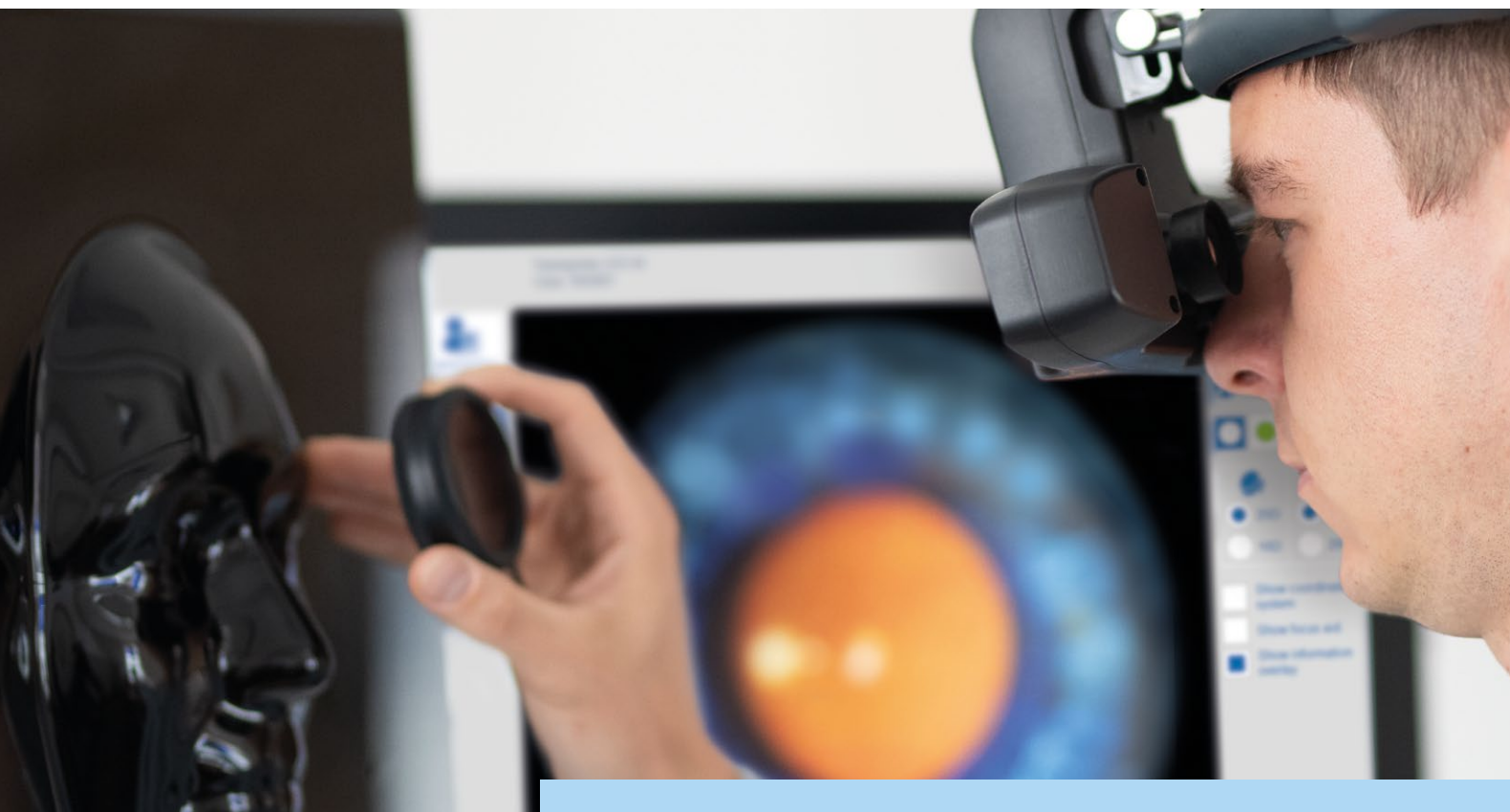
# Realistic training of retinal examinations

The Eyesi Indirect simulator mimics an indirect ophthalmoscope down to the last detail, using a head-mounted stereo display on an ophthalmoscope headband, two diagnostic lenses, and a patient model head. A touch screen displays the user interface and a live view of the examination.

HIGH-END AUGMENTED REALITY

## Immersive training experience

Eyesi Indirect applies augmented reality technology, combining real and virtual images. When trainees put on the ophthalmoscope hat, they see their own hand holding the virtual lens and a three-dimensional virtual patient in place of the model head. Only if the lens is positioned correctly students can see an image of the patient's retina in the lens.



#### LIFELIKE INDIRECT OPHTHALMOSCOPE

## Device handling

In order to examine the virtual patient, trainees need to look through the oculars at the patient model head and direct the ophthalmoscope's light source to one of the patient's eyes. They must position the lens in the line of sight between their eyes and the patient's eye. While moving the lens closer to the patient, the magnified image of the retina fills the lens. The oculars can be adjusted to the individual interpupillary distance by sliding them to the left or the right.

#### REAL-TIME SIMULATION

## Ophthalmoscope optics

Eyesi Indirect provides a highly realistic and dynamic 3D simulation of the patients' retinas and the ophthalmoscope optics, allowing trainees to get accustomed to physical optical effects such as chromatic aberration or inversion of the image.

#### LIGHT AND LENS

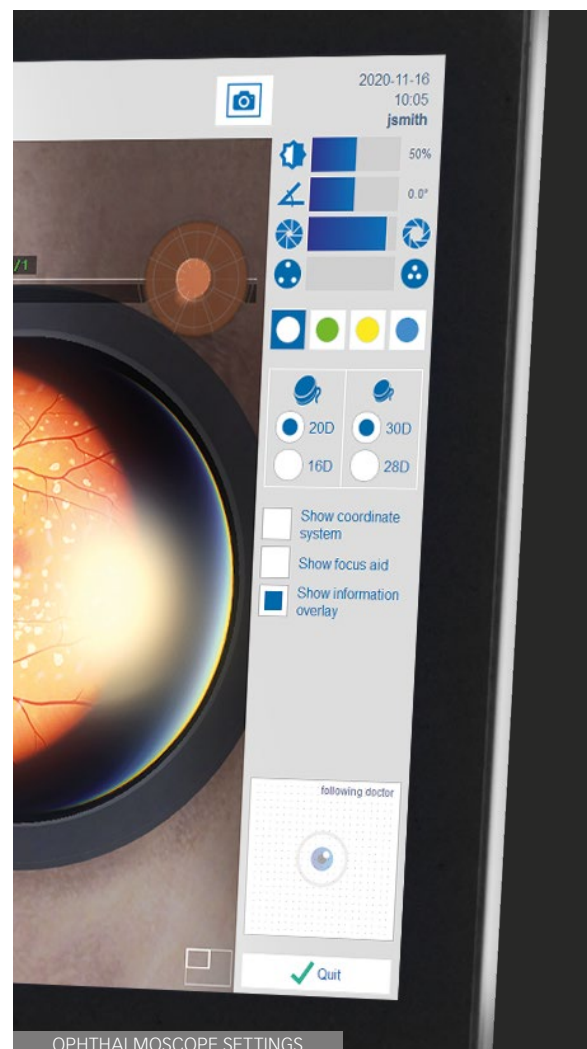
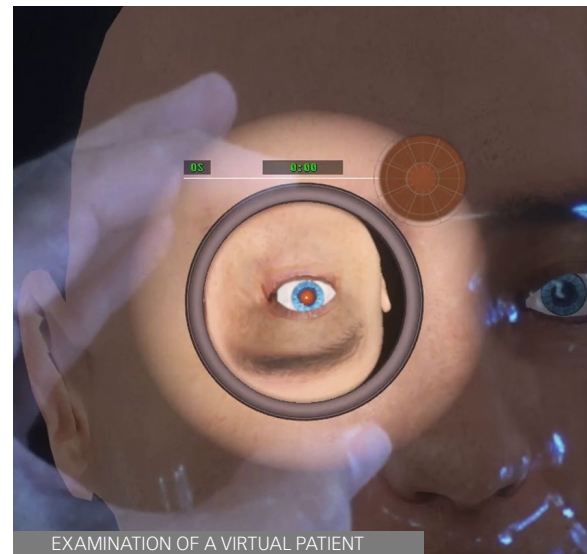
## Ophthalmoscope settings

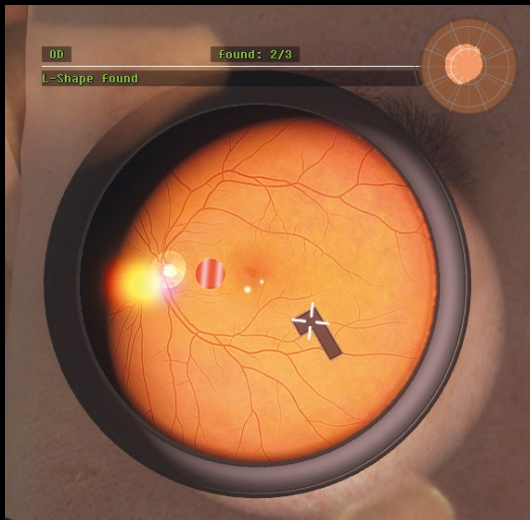
On the touch screen, trainees can control the indirect ophthalmoscope settings, such as the angle and diameter of the light cone, light intensity, filters, lens magnification, or adapting the optics to the patient's pupil size.

#### PATIENT'S EYES

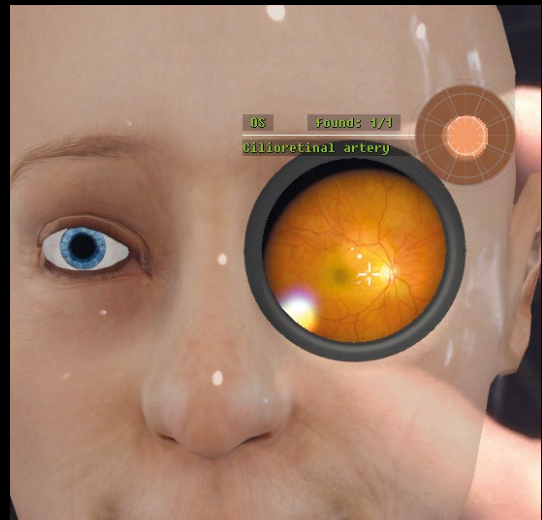
## Examination settings

The patient's viewing direction can intuitively be changed using a touchpad at the bottom of the settings menu on the touchscreen.

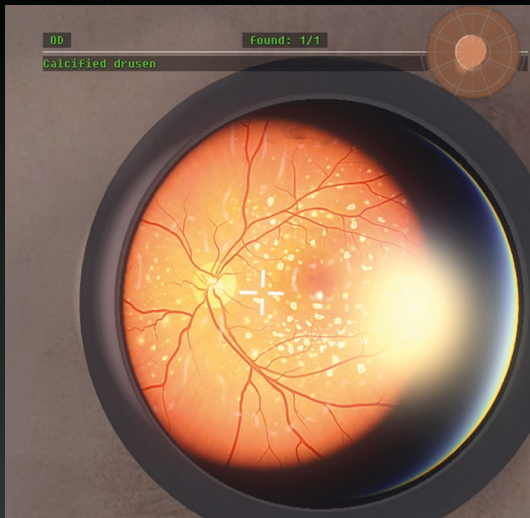




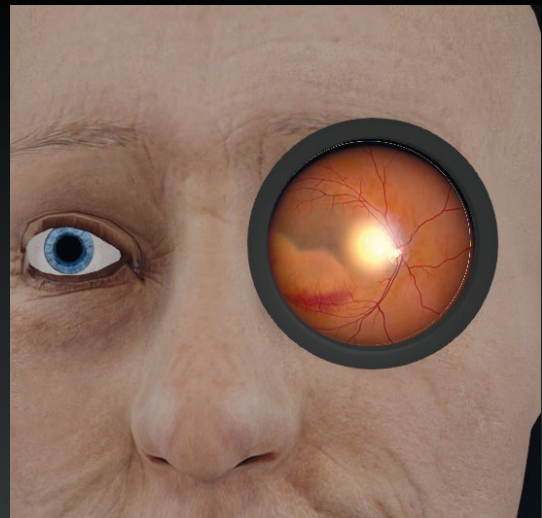
TIER A DEVICE HANDLING



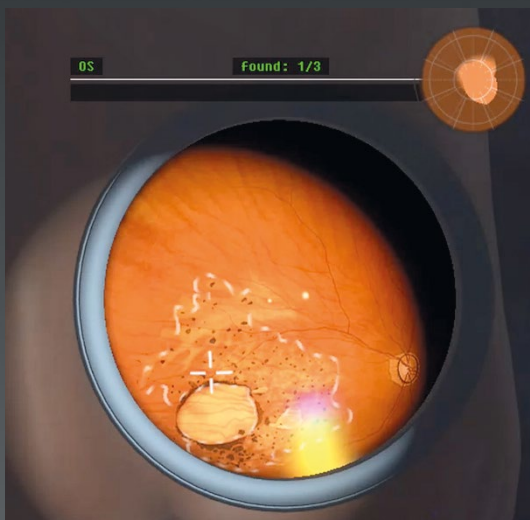
TIER B ANATOMICAL STRUCTURES



TIER C BASIC FINDINGS AND DIAGNOSES



TIER D CLINICAL CASES



ADVANCED CASES

Step-by-step to  
expert performance

# Eyesi Indirect courseware

## Curriculum for self-guided learning

Simulator-based training allows for a standardized learning experience and ensures that all students reach the same level of clinical proficiency. With a ready-to-go courseware, the Eyesi Indirect simulator can easily be integrated into educational programs.

### STANDARDIZED CURRICULUM

## Ready-to-go courseware

Eyesi Indirect comes with a didactically structured curriculum, which has been designed to provide a broad and standardized clinical experience using a wide range of training scenarios. Students advance through the curriculum independently and self-guided. Educators can lock or unlock courses as required.

### CASE-BASED APPROACH

## Database of virtual patients

The Eyesi Indirect curriculum uses a case-based approach to teach diagnostic skills. In order to efficiently teach ophthalmoscope handling, the simulator features abstract cases, where geometric shapes need to be found on the retina. The clinical cases, designed for developing diagnostic abilities, provide detailed patient histories and results of diagnostic procedures such as OCT imaging, angiography, or perimetry. The case database contains a wide range of clinically relevant pathologies, ranging from macular degenerations and hereditary disorders to tumors in the chorioretinal complex.

### OVERVIEW

## Eyesi Indirect courseware

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### Tier A: Examination skills

Trainees screen the retina to find abstract objects and document the location, shape, and size of these objects on a fundus chart. This helps them to learn ophthalmoscope handling and interpret the inverted fundus image.

### Tier B: Anatomical structures

Tier B offers a variety of healthy retinas from patients of different gender, age, and ethnicity. Trainees learn to identify anatomical features and classify characteristics of healthy retinas.

### Tier C: Basic findings and diagnoses

Tier C introduces common pathologies such as AMD or diabetes and represents the first step in diagnosing pathological patterns. Students practice how to identify and classify signs of specific pathologies.

### Tier D: Clinical cases

The clinical cases are based on real patient cases and help trainees develop clinical skills such as making diagnoses and therapeutic decisions. Clinical cases may have complicated pathologies that need to be distinguished from differential diagnoses.

### Advanced cases

This tier offers advanced cases, such as pathologies prevalent in tropical and subtropical regions, with a complete, detailed clinical history, including physical examination and laboratory findings.

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# Educational guidance

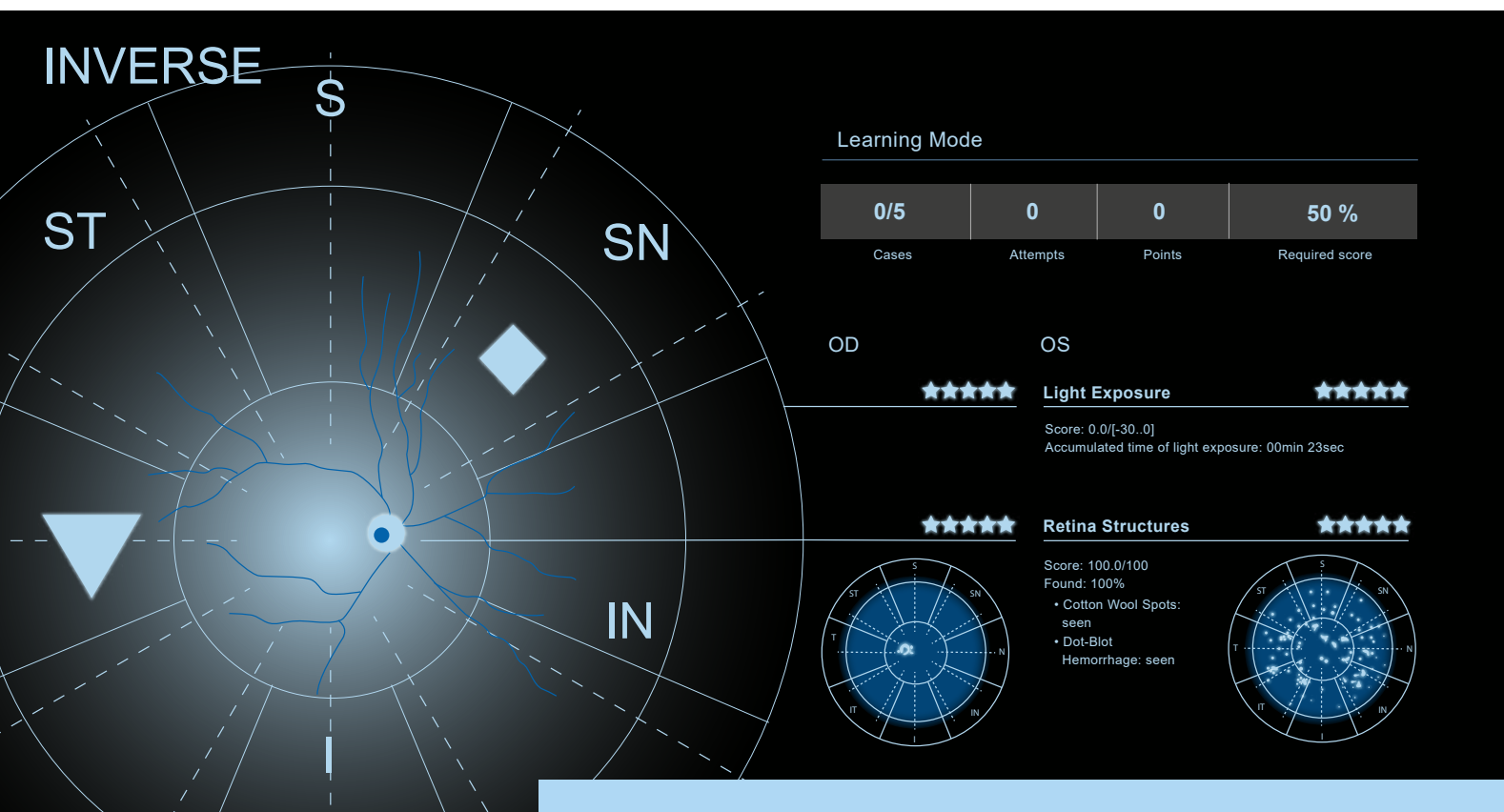
## Feedback & assessment

Eyesi Indirect offers an interactive training environment that provides trainees with immediate feedback on their performance. Educational guidance elements support beginners in their learning process. Additional medical background information helps to deepen the understanding of anatomical and pathological characteristics. A personal findings library, which is also accessible on the VRmNet web portal, allows students to recap their learning matter.

### PERFORMANCE MONITORING

## Training reports

After each case, Eyesi Indirect presents trainees with a detailed performance summary. The training system records various parameters relating to procedural and diagnostic abilities. The detailed evaluation allows trainees to improve their skills systematically. Required minimum scores ensure that trainees meet a certain skill level. Comprehensive training reports also allow educators to assess their trainees' skill acquisition.

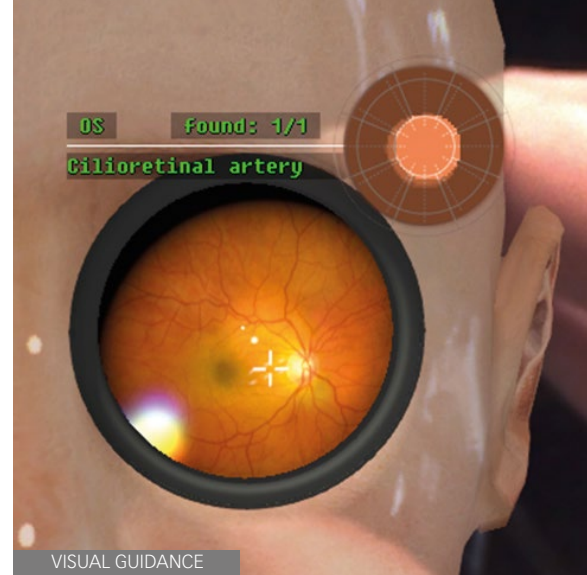




## EDUCATIONAL SUPPORT

# Guidance elements

Eyesi Indirect features visual and auditive guidance to support beginners in their learning process, for example, by highlighting anatomical findings on the retina. During the examination, a head-up display is visible in the oculars of the ophthalmoscope showing information such as the name of detected anatomical structures or the duration of the examination. For better orientation, the head-up display also provides a retina chart that highlights the areas already examined.

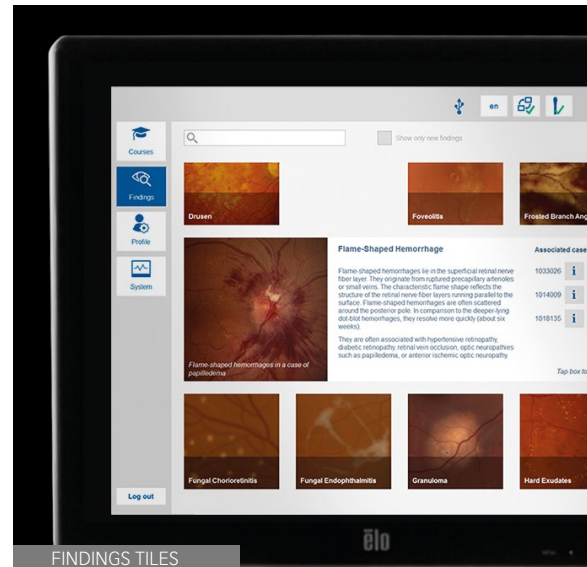


VISUAL GUIDANCE

## MEDICAL BACKGROUND

# Findings tiles

When a trainee detects a pathological finding in the more advanced cases, it is highlighted on the retina. A findings tile appears on the touch screen, providing medical background information. All detected findings are stored in the trainee's personal findings library and are also accessible on the VRmNet web portal for recap. The findings menu on the simulator can be used to start cases associated with the specific finding.



FINDINGS TILES

## DOCUMENTATION

# Fundus editor

To foster correct interpretation of the inverted retina image and correct documentation of findings, trainees need to find abstract objects and mark their location, orientation, and size in a fundus editor in the introductory cases.

## DIAGNOSTIC TRAINING

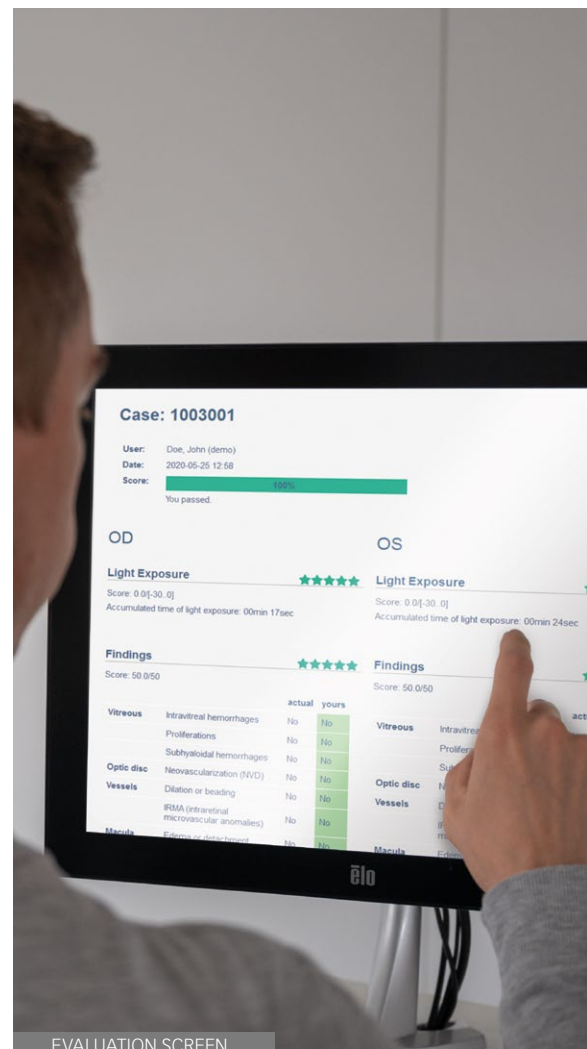
# Multiple-choice forms

In the clinical cases, trainees have to find pathological signs without guidance and specify their findings and diagnoses in multiple-choice forms, which are then evaluated by the training system.

## PERFORMANCE ASSESSMENT

# Detailed evaluation

At the end of each examination, trainees are presented with a detailed evaluation of their examination and diagnostic performance. Scored parameters include the percentage of retina examined, light exposure, completeness of pathological signs found, and the accuracy of the diagnosis. Both trainees and educators also have access to the accumulated training data on the VRmNet web portal.



EVALUATION SCREEN

# VRmNet

## Web portal for networked simulators

VRmNet is a web-based service available for networked medical training simulators from Haag-Streit Simulation. The web portal offers online features for both trainees and educators. Users can access their personalized VRmNet dashboard from any computer or mobile device 24/7.

### EASY ADMINISTRATION

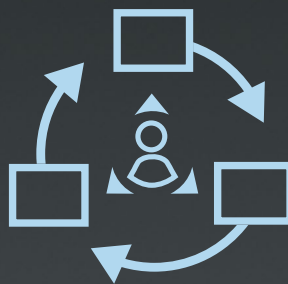
## Teaching large classes efficiently

Educators can use VRmNet to comfortably set up users and manage courses. Configurable notifications and reports keep teachers informed on their classes' training status. Trainees log in to VRmNet to access their training data and their findings library for recap of learning content. To prepare trainees for their first training session, VRmNet provides an online orientation with short videos on simulator usage.

### Benefits for operation and service



Automatic updates



Optimized allocation



Online service

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## Administration tools

Educators can use VRmNet to comfortably set up users, manage courses, and monitor their classes' training progress.

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## Online learning for trainees

For trainees, VRmNet features an online orientation on training with the Eyesi Indirect simulator and medical background information for recap of learning content.

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## Automatic software updates

All simulators connected to VRmNet receive the latest software updates automatically. Customers profit from data back-ups and synchronization as well as easily operated service through the VRmNet networking.



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