eyesi
by VRmagic

Indirect Ophthalmoscope Simulator

VRmagic

Training Diagnostic Skills

Indirect Ophthalmoscopy is Difficult to Master

The binocular indirect ophthalmoscope has been around for more than 150 years, and it is still indispensable for eye examinations. Indirect ophthalmoscopy is difficult to master, as it requires fine motor skills and the ability to interpret an inverted retina image, in combination with the knowledge necessary to reliably identify the multitude of pathological findings possible.

Eyesi Indirect is a Highly Efficient Training Method

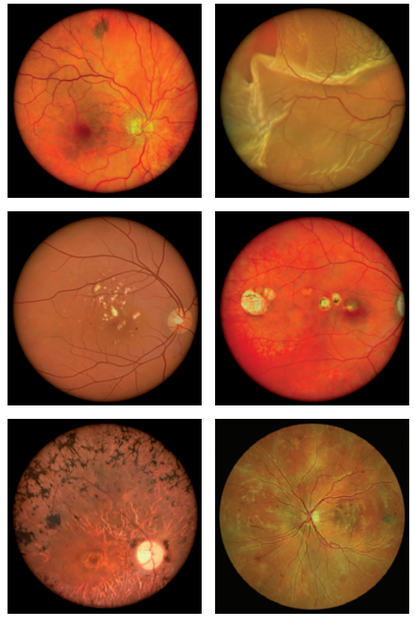
Training with real patients remains important, but it is almost impossible to offer a comparable learning experience to each student relying on real-life practice. Eyesi Indirect can improve education by providing a broad and standardized clinical experience before students examine their first real patient: Virtual patients with relevant pathologies are always available, students can practice independently and as often as they need, and each examination is evaluated objectively.

"Only 22% of all respondents felt their undergraduate ophthalmic medical education to be adequate. [...] Despite the availability of an ophthalmoscope [...] only 56% felt confident with the ophthalmoscope [...]."

Shuttleworth GN, Marsh GW. How effective is undergraduate and postgraduate teaching in ophthalmology? Survey among 150 randomly selected primary care practitioners. Eye (Lond). 1997;11 (Pt 5):744-50.

"Our study provides evidence that a short training with an AR simulator [Eyesi Indirect] significantly improves indirect ophthalmoscopy skills compared with training with CO [a conventional binocular indirect ophthalmoscope]"

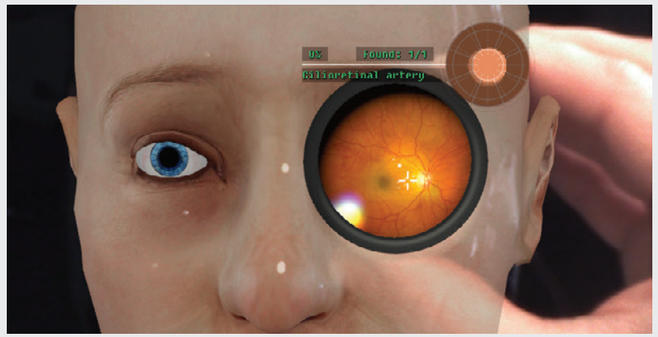
Leitritz MA, Ziemssen F, Suesskind D, Partsch M, Voykov B, Bartz-Schmidt KU, Szurman GB. Critical evaluation of the usability of augmented reality ophthalmoscopy for the training of inexperienced examiners. Retina. 2014 Apr;34(4):785-91. doi: 10.1097/IAE.0b013e3182a2e75d.



Top: Some examples of virtual patients' retinas.

Top: Eyesi Indirect Ophthalmoscope Simulator

Right: While wearing the indirect ophthalmoscope hat, students must hold the lens correctly to see an image of the patient's retina – like in a real examination.



Left: Trainees see a three-dimensional virtual patient and their own hand holding the diagnostic lens.

Eye Examinations Close to Reality

Diagnostic Practice for Students and Residents

Eyesi Indirect is an advanced diagnostic training system for binocular indirect ophthalmoscopy. With a comprehensive database of clinically relevant pathologies, it significantly extends the range of diagnostic training available to ophthalmology and optometry students or residents.

Ophthalmoscopy Training in a Lifelike Setting

The training 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 model patient head. Further components of the simulator are the touch screen, which displays the user interface and a live view of the examination, and the processing unit that runs the simulator software.

The Virtual Patient Comes Alive

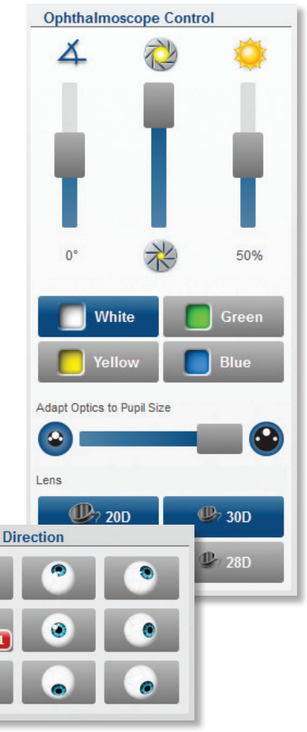
The simulator uses augmented reality, combining real and virtual images. When trainees put on the ophthalmoscope hat, they see a high-fidelity, three-dimensional virtual patient instead of the model head, and their own hand holding the virtual lens. If the lens is positioned correctly, students see an image of the patient's retina in the lens.

Case-Based Diagnostic Training

Eyesi Indirect uses a case-based approach to teach diagnostic skills. The case database contains a wide range of training scenarios and clinically relevant pathologies. Students hone their examination and diagnostic skills by repeating the examination procedure with many different patients. As a result, students are better prepared and feel more confident when examining their first real patient.

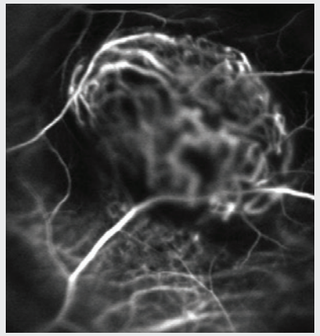
Immediate and Objective Feedback

At the end of each examination, the trainee is presented with a detailed evaluation of the examination and diagnostic performance. Scored parameters include, for example, the percentage of retina examined, the light exposure, and the accuracy of the diagnosis. The simulator's capacity to provide immediate, objective feedback allows for a competency-based assessment and systematic improvement of skills.



Top: Students practicing with Eyesi Indirect

Right: Multiple-choice questions on patient history, therapy, or pathologies supplement the clinical cases.



Top: Indirect ophthalmoscope controls displayed on the touch screen

Left: A clinical case dealing with a choroidal melanoma. Results of additional diagnostic procedures are available, for example OCT scans or ICG angiography.

Eyesi Indirect Training Curriculum

Out of the Box Training Curriculum

Eyesi Indirect comes with a structured curriculum developed in cooperation with ophthalmologists. The curriculum consists of four tiers that contain several courses. Students advance through the curriculum independently by completing the cases within a course. Educators can lock or unlock courses as required.

Tier A Examination Skills

When learning how to use the indirect ophthalmoscope, trainees screen the retina to find abstract objects. They then document the location, shape, and size of these objects on a fundus chart. This helps them to learn how to interpret the inverted image correctly, and memorize findings.

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 learning how to diagnose pathological patterns. Students practice how to identify and classify signs of specific pathologies.

Tier D Clinical Cases

The clinical cases are modeled on real patient cases and help trainees to develop clinical skills such as making diagnoses and therapeutic decisions. Clinical cases may have complicated pathologies that need to be differentiated against multiple possible diagnoses.

Educational Guidance and Medical Content for Students

When a trainee detects a finding in tier B or C, it is highlighted on the retina and a findings tile with a brief description is shown on the touch screen. The trainee can tap the tile to view additional medical information. All detected findings are stored in the trainee's personal findings library, which can be viewed at any time.

Patient Information and Additional Diagnostics

The training system provides medical background information to guide trainees in the process of evolving a diagnosis. The clinical cases present extensive information on the virtual patient, including patient history, referral cause, and results of diagnostic procedures such as OCT imaging, angiography, or perimetry. Many cases are supplemented by multiple-choice questions and commentaries from ophthalmologists.

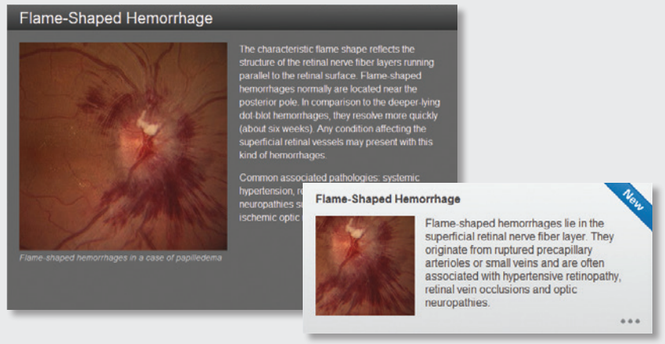
A Examination Skills
Basic understanding, motor skill training, and documentation of abstract findings

B Anatomical Structures
Introduction to anatomical features and characteristics of different healthy retinas

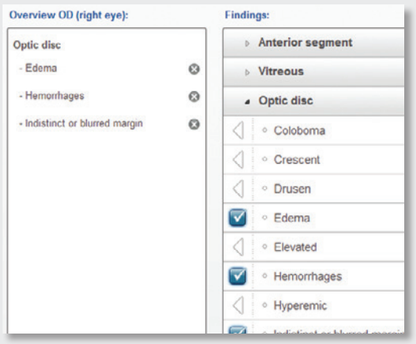
C Basic Findings and Diagnoses
Introduction to common pathologies and their typical findings

D Clinical Cases
Diagnosis of a wide range of pathologies with additional patient information

In tiers B and C, students learn to identify anatomical features and pathological findings. Detected findings are highlighted, so that students can memorize their appearance.

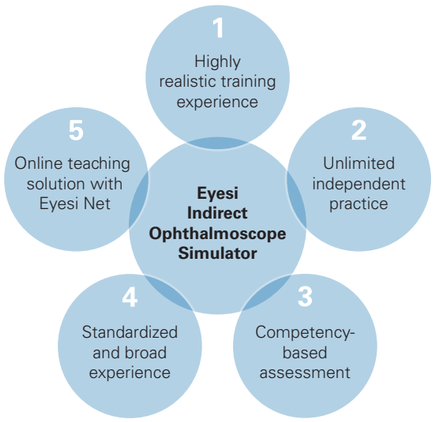


When a student detects a finding, a tile with additional medical information is displayed on the touch screen. The tiles are collected in the student's individual findings library.



In advanced cases, findings and diagnoses must be specified in multiple-choice input forms.

5 Reasons for Eyesi Indirect



Highly Realistic Training Experience

The Eyesi Indirect Ophthalmoscope Simulator uses augmented reality and real ophthalmoscope components to offer a highly immersive and realistic experience. Trainees will learn to diagnose pathologies reliably on lifelike retinas using correct ophthalmoscopy techniques – without risk to patients and independent of patient flow.

Unlimited Independent Practice

The diagnostic skill of indirect ophthalmoscopy can only be gained through intense practice. At the same time, teaching time is an ongoing cost for medical schools. The use of high fidelity simulation allows ophthalmology students to practice independently until they feel confident using the ophthalmoscope. The curriculum is based on the principle of "deliberate practice": frequent practice at a suitable level of challenge with immediate objective feedback. This ensures that refinements can be made after each examination.

Competency-Based Assessment

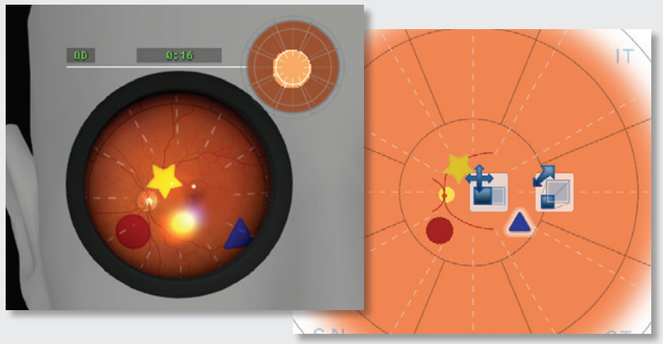
Eyesi Indirect provides objective and immediate feedback after each virtual exam, so that students can systematically improve their skills. Designated educators can access students' training data through VRmNet. This way, educators can keep track of training progress and assess students' skill levels as they advance through the curriculum.

Standardized and Broad Experience

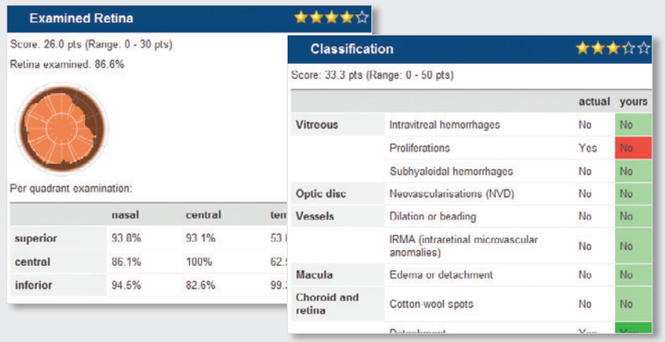
The simulator curriculum offers a broad clinical experience. Starting with the basic skill of handling the ophthalmoscope, trainees continue with the identification of common pathologies such as diabetes or AMD. In advanced courses, the clinical cases cover a wide range of pathologies and include a patient history, results of additional diagnostic procedures, multiple choice questions, recommendations for therapy, and comments from experienced ophthalmologists.

Online Teaching Solution with VRmNet

Eyesi Indirect is more than a stand-alone simulator. The online features that come with VRmNet bring it to life, and help you to teach large groups of students efficiently. Manage large numbers of students with the web-based user administration, get them up to speed quickly using the online learning resources, and have their training progress always at your fingertips via a user-friendly web interface.



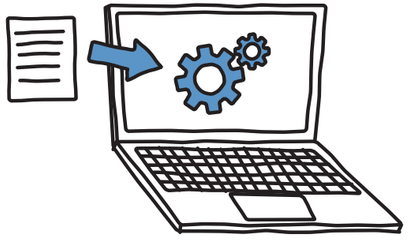
Right: To learn memorizing of retinal findings, introductory cases show abstract objects which have to be found and marked on a fundus scheme.



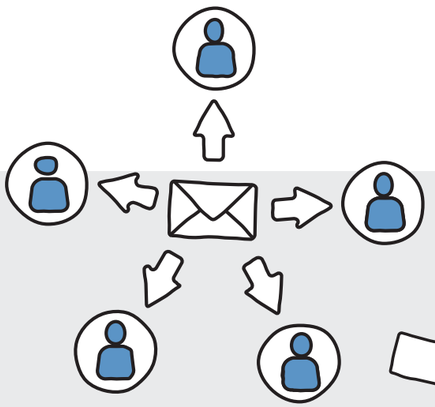
Left: After the examination, different aspects are evaluated and presented to the student.

Teaching a Class of a Hundred Students

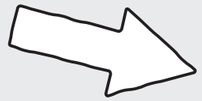
VRmNet in a Nutshell



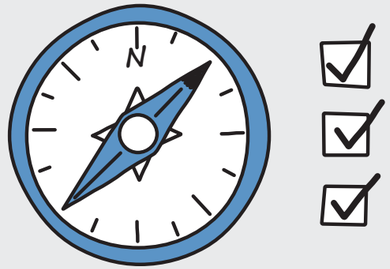
#1 Automatic User Creation
You can create user accounts with only a few clicks. All you need to do is upload a list with student names to VRmNet.



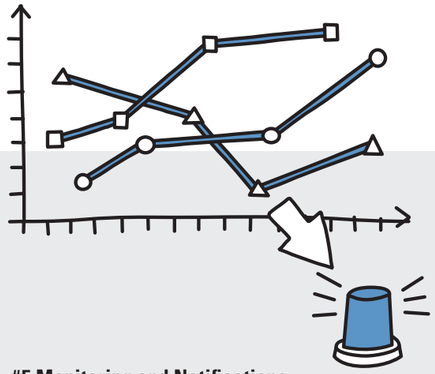
#2 Automatic Email
An automatic email with an individual user account and a link to the VRmNet website is sent to each student.



#3 Online Orientation
Students log in to the VRmNet website and complete an online orientation to activate their user accounts for simulator access.



#4 Independent Practice
Students start training independently and receive immediate, objective feedback on their performance.



#5 Monitoring and Notifications
You can monitor your students' training progress online. Configurable notifications and reports keep you informed on important milestones.

Efficient Management of Large Numbers of Students

Integrating Eyesi Indirect into medical education has two main advantages. The first is quality: each student can achieve a similarly high level of proficiency using the simulator. The second is efficiency: With VRmNet, a web-based teaching solution, hundreds of students can learn ophthalmoscopy completely independently.

Comfortable and Secure Web-Based Administration

Teachers can manage all Eyesi simulators through the secure VRmNet website. Creating new user accounts for students can be done within minutes from any PC with an Internet connection, without physically sitting in front of a simulator. As soon as the students have received their user accounts via email, they can start training.

Online Orientation Course and Quality Medical Content

VRmNet provides an online orientation that prepares students for their first training session. Trainees can activate their user accounts for simulator access by completing the online orientation and passing a multiple choice test from any mobile device or PC. The individual training history and a personalized findings library with additional medical information are available for students via the VRmNet website.

Efficient Use of Multiple Devices in Your Institution

To teach a large numbers of students, multiple Eyesi devices can be installed in one institution. With VRmNet, your students' training progress is synchronized between selected devices and stored on a central server. This way students can start training on one device and continue on a different device the next day. Data synchronization also provides for an automatic backup. The training data is stored locally on your devices and centrally on the VRmNet server.

Easy Monitoring of Your Students' Progress

The training data of your students is consolidated into a single training history. Designated teachers can access this history from any mobile device or PC and monitor the students' progress easily via an encrypted SSL connection. Automatic reports and notifications on important milestones keep you informed, for example when a student has finished the training curriculum.

#6 Certificate and Assessment
Students automatically receive a certificate after completion, and can view an objective assessment of their skills.

For more information on the Eyesi Surgical Simulator or on the Eyesi Indirect and Direct Ophthalmoscope Simulators, please contact:

VRmagic GmbH
Turley-Str. 20
68167 Mannheim
Germany
Phone +49 621 400 416-0
Fax +49 621 400 416-99

VRmagic Inc.
245 First Street, 18th floor
Cambridge, MA 02142
USA
Phone +1 617 444-8761
Fax +1 617 444-8405

info@vrmagic.com
www.vrmagic.com