EVOptica

OPHTHALMIC INSTRUMENTS / ENGLISH EDITION

HERON PLUS

User Manual

TECHNICAL REVIEW EDITION



Full English translation of the supplied manual. Source inconsistencies are identified for technical review. This document is not a released clinical IFU for a new US configuration.

evoptica.com

contact@evoptica.com

About this English edition

This edition translates the supplied original instructions and updates the corporate identity and contact details to EVOptica. It does not change instrument operation, calibration values, treatment parameters or the documented software behavior.

TECHNICAL REVIEW EDITION - NOT A RELEASED CLINICAL IFU

The supplied originals contain unresolved configuration differences, malformed values and, in places, text apparently copied from other instruments. These differences have been identified without guessing a correction. Manufacturer engineering and clinical review is required before releasing instructions for a specific product configuration.

Navigation and original references

Source section numbers below refer to pages in the supplied original. The English layout has its own footer page numbers. The linked section list and PDF bookmarks navigate this edition; original figure, table and contents references retain their source context.

Screenshots and interface labels

Illustrations document the original software interface. Portuguese button labels are retained where needed and paired with English descriptions. This translation does not imply that the underlying software has been localized or that obsolete operating systems and network settings are a new configuration recommendation.

The full configuration and source-review notes appear after the translated instructions. Resolve those notes before releasing this document for a specific instrument configuration.

Linked source-section contents

1 / HERON PLUS - Noncontact Specular Microscope
3 / The Dedication
4 / Source section 4
5 / Conventions and Abbreviations
6 / Contents
7 / Contents - Continued
8 / Figures
9 / 1.0 Introduction
10 / Source section 10
11 / 2.0 Product
12 / 4.0 Technical Specifications
13 / 5.0 Using HERON Software
14 / Source section 14
15 / Calibration
16 / Source section 16
17 / Source section 17
18 / 5.2 Image Capture Techniques in Specular Microscopy Using HERON Focusing
19 / 5.3 Preparing HERON for Examinations
20 / Source section 20
21 / Multisession Screen
22 / 5.4 Preparing Patients for Examination
23 / Source section 23
24 / Source section 24
25 / Source section 25
26 / Source section 26
27 / Review Examinations
28 / Source section 28
29 / Comparison
30 / Source section 30
31 / 6. Special Conditions for Product Storage, Preservation and Handling
32 / Before Installation
33 / After Installation
34 / 7.3 Electrical Hazard Warnings and Precautions
35 / 7.6 Cleaning Warnings and Precautions
36 / 9 Installation or Connection to Other Instruments
37 / 11 Precautions if Product Operation Changes
38 / 14 Precautions When Taking the Product Out of Service
39 / 18 References
40 / 20 Notes

SOURCE SECTION 1

HERON PLUS - Noncontact Specular Microscope

User Manual. Revision 03.

Partners

Our company's success results from collaboration with several other companies. We thank our partners and hope these partnerships continue.

EVOptica, 221 S Main St, Fairport, NY 14450, USA. Call/text: +1-315-210-8976. contact@evoptica.com. https://evoptica.com.

Illustrations - source section 1



SOURCE SECTION 3

The Dedication

HERON, also written Hero or Heron of Alexandria (AD 10-70), was a scholar of the early Christian era. A Greek geometer and engineer active around AD 62, he is especially known for the formula bearing his name for calculating a triangle's area. His most important work on metric geometry remained lost until 1896. Hero became known for inventing a mechanism demonstrating air pressure on bodies, remembered as the first documented steam engine, the aeolipile.

A Greek mathematician and mechanic of the first century, he wrote Metrica, a treatise on measuring simple figures and solid planes, with proofs of the formulas involved. It addressed division of plane and solid figures and contains Heron's formula, possibly discovered by Archimedes, for triangle area, plus a method, anticipated by the Babylonians, for approximating square roots of nonsquare numbers.

His Mechanics, preserved by Arab scholars, announces the parallelogram rule for composing velocities, determines simple centers of gravity and discusses gears allowing a small force to lift heavy weights.

Catoptrica concerns light reflection by mirrors and demonstrates that equal incidence and reflection angles follow from the shortest path from the source to the observer's eye. Various machines, including Heron's fountain and the aeolipile (described in the original text as an instrument for measuring winds), are also attributed to him.

The world's oldest robot naturally had neither a silicon brain nor electric power, yet could walk, present and perform.

Several modern researchers have revisited this first-century automaton, including British computer scientist Noel Sharkey of the University of Sheffield. Sharkey examined the theoretical works of HERON of Alexandria, its creator, and says he discovered that it was the...

Illustrations - source section 3



SOURCE SECTION 4

...first machine guided by a preset program, like modern computers. Without a hard drive or RAM, programming was built into the robot through ropes wound in a particular sequence around its front wheel axles.

Wheat supplied the driving force. At the automaton's rear, the rope around the axles was attached to a weight at the top of a tube filled with grain. Grain slowly fell through a hole, progressively lowering the weight and turning the axles to move the robot.

HERON, a contemporary of Jesus Christ and the first apostles, refined the invention to perform complex movements without human intervention: automatically moving forward and backward along a predetermined route, pausing and resuming.

This is not his first recognition as a technological pioneer. Accounts describe the first beverage vending machine: inserting a coin produced a jet of water. Priests hired HERON to automate temples and impress worshippers.

For his achievements as a mathematician and inventor, and especially his discovery of the basic principle of the law of reflection, from which specular reflection derives, we dedicate the name of our specular microscope, HERON, to this great man.

Original development team, December 2009.

WARNING! Read all information in these Instructions for Use carefully before operating the instrument.

SOURCE SECTION 5

Conventions and Abbreviations

LF: slit lamp. HS: Haag-Streit. ME: specular microscope. USP: University of São Paulo. UFSCar: Federal University of São Carlos. IPD: ParqTec Design Institute. PDF: Adobe Acrobat Reader document format (www.adobe.com). CCD: “Charge Coupling Device,” the silicon sensor technology of the modern CCD cameras used by HERON. ParqTec: São Carlos Technology Park Foundation.

Endothelial density is always displayed on the monitor and printed in reports as cells per square millimeter. Minimum, mean and maximum cell sizes are measured in square micrometers, or square microns.

Micrometers: microns or um. Millimeters: mm. Software button and menu item names appear between angle brackets (< >).

SOURCE SECTION 6

Contents

1.0 Introduction - 09
2.0 Product - 11
3.0 Components - 11
4.0 Technical Specifications - 12
5.0 HERON Software - 13
5.1 Using the Software - 13
5.2 Image Capture Techniques - 18
5.3 Preparing the System for Examination - 19
5.4 Preparing Patients for Examination - 22
6.0 Storage, Preservation and Handling - 31
6.1 Packaging - 32
6.2 Storage - 32
6.3 Transport - 32
6.4 Placement - 33
6.5 Preservation - 33
7.0 Warnings and Precautions - 33
7.1 Users - 33
7.2 Explosions - 33
7.3 Electrical Hazards - 34
7.4 Transport and Storage - 34
7.5 During Maintenance - 34
7.6 During Cleaning - 35

SOURCE SECTION 7

Contents - Continued

8.0 Product Performance - 35
8.1 Indication and Intended Use - 35
8.2 Undesirable Effects - 35
8.3 Safety and Effectiveness - 35
9.0 Connection to Other Instruments - 36
9.1 Important Recommendations - 36
10.0 Troubleshooting - 36
11.0 Operating Precautions - 37
12.0 Cleaning Procedure - 37
12.1 Lens and Reflecting Mirror Cleaning - 37
12.2 Sliding Plate, Rails and Shaft Cleaning - 37
12.3 Disinfecting Plastic Parts - 37
13.0 Sensitivity to Environmental Conditions - 37
14.0 Precautions: Taking Out of Service - 38
15.0 Product Presentation - 38
16.0 Warranty Terms - 38
17.0 Warranty Terms - 38
18.0 References - 39
19.0 Acknowledgments - 39
20.0 Notes - 40

SOURCE SECTION 8

Figures

Figure 1.1 HERON hardware - 11
Figure 1.2 Documents and accessories - 12
Figure 1.3 Active physician selection - 13
Figure 1.4 Adding/removing physicians - 14
Figure 1.5 Clinic registration - 15
Figure 1.6 Millimeter calibration - 15
Figure 1.7 Millimeter ruler - 16
Figure 1.8 HERON general settings - 16
Figure 1.9 Connection settings - 17
Figure 1.10 Camera settings - 18
Figure 1.11 Examination home screen - 19
Figure 1.12 Patient registration and selection - 20
Figure 1.13 Registration screen - 20
Figure 1.14 Multisession screen - 21
Figure 1.15 Capture screen - 21
Figure 1.16 Slit positioned on the patient's eye - 23
Figure 1.17 Simulated base movements - 23
Figure 1.18 Image capture sequence - 23
Figure 1.19 Selecting the best image - 24
Figure 1.20 Clear cell images - 24
Figure 1.21 Cell analysis results - 25
Figure 1.22 Saving examination, notes and eye confirmation - 25
Figure 1.23 Saving examination - 26
Figure 1.24 Reviewing examinations - 27
Figure 1.25 Patient search - 28
Figure 1.26 Examinations - 28
Figure 1.27 Comparative report - 30
Figure 1.28 Table base - 31
Figure 1.29 On/off buttons - 31
Figure 1.30 Packaging precautions - 32
Figure 1.31 Possible problems table - 36

SOURCE SECTION 9

1.0 Introduction

Welcome to the HERON user manual. You have acquired one of the most advanced cell analysis systems available, made with Brazilian technology by a team experienced at leading vision science universities worldwide.

The original manufacturer, Wavetek, was founded in 2006 when one founder returned from the renowned Center for Visual Sciences at the University of Rochester, a major vision research center at an American university renowned for optics (www.rochester.edu). It was based in São Carlos, the “Technology Capital” in the interior of São Paulo State. That founder also earned a doctorate at the São Carlos Institute of Physics, USP, with a visiting research period at the Vision Science Department of the University of California, Berkeley, USA, and became a renowned ophthalmic researcher and entrepreneur.

Rochester has long been famous: Bausch & Lomb, Kodak and Xerox are three internationally renowned companies founded there.

Another founder was an electrical engineer trained at USP’s São Carlos School of Engineering, with more than fifteen years of ophthalmic optical instrumentation experience. Familiar with modern physicians’ diagnostic and clinical needs, he also established the medical department of a nationally and internationally recognized company and became commercial director. Other partners were investors from different economic sectors and of different sizes, serving on the board without routine involvement in daily operations.

For more information and downloads, visit https://evoptica.com.

HERON was developed by qualified professionals for qualified professionals, rather than as an amateur product or second choice. It was conceived for physicians seeking greater returns on a lower investment. Brazilian manufacture made it more accessible, with electronics imported from Japan and optics made partly in São Carlos and partly in the USA.

HERON was developed for ophthalmologists using a specular microscope for routine examinations and those conducting research, preparing classes, exporting images to the internet or...

SOURCE SECTION 10

...PowerPoint for conferences, and processing those images. All these functions are possible in HERON software.

HERON is more than a console for statistical endothelial cell measurements. Its Windows Vista-based software and hardware provide richly informative printed reports, manual or automatic measurements, selection of as many image portions as desired for processing, and choice of the most useful images from sequential captures. Dedicated consoles do not offer these options. Here, “dedicated consoles” means standalone ophthalmic instruments with built-in computers that generally do not use conventional operating systems such as Windows, limiting easy maintenance, software upgrades and replacement of just the processing unit.

With standalone equipment, a failure would generally force replacement of the whole instrument, resulting in an expensive console often obsolete within a few years. HERON permits rapid recall because it uses a powerful personal computer rather than a standalone platform. Rapid, effective software and hardware upgrades extend its life beyond standalone instruments.

Thank you for choosing HERON. We welcome opinions and suggestions through https://evoptica.com, contact@evoptica.com, or +1-315-210-8976 call/text.

The original manufacturer emphasized Brazilian roots and international experience, aiming to lead ophthalmic optics with excellent quality, competitive prices and personalized customer service.

Thank you for your confidence.

Original signatory: Prof. Dr. Luis Alberto Vieira de Carvalho, MSc, PhD, President, Wavetek Technologies Indústria, Comércio, Importação e Exportação de Produtos Médicos e Ópticos Ltda.

SOURCE SECTION 11

2.0 Product

Technical name: Ophthalmic Microscope. Commercial name: Noncontact Specular Microscope. Commercial model in the original product section: WAVETEK HERON 2.0. Manual headers identify HERON PLUS. Brand: EVOptica.

Current contact: EVOptica, 221 S Main St, Fairport, NY 14450, USA; +1-315-210-8976 call/text; contact@evoptica.com; https://evoptica.com.

Original manufacturer: Wavetek Indústria Comércio Importação Exportação de Produtos Médicos e Ópticos Ltda. Original Brazilian corporate registration (CNPJ): 08.109.979/0001-42. Original technical officer: Elizeu Ramos, CREA-SP no. 0685024172. Original ANVISA registration number: blank in the source. These are historical instrument references.

3.0 Components - Instrument Parts

HERON consists of hardware and software. Hardware comprises the optics (the microscope itself) and the computer and peripherals.

Figure 1.1 shows the specular microscope or HERON optical head, patient head support (chinrest and forehead rest), electric height-adjustable table, computer CPU (Central Processing Unit), LCD monitor, keyboard and mouse.

Figure 1.1 - HERON hardware components.

Illustrations - source section 11



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 12

Besides the hardware, the HERON package contains a printed manual (A), an image capture foot pedal (B), and an installation CD containing all HERON software and digital PDF documentation (C); see Figure 1.2.

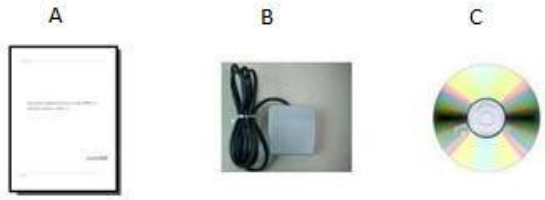
Figure 1.2 - Documents and accessories supplied with HERON.

DO NOT ALLOW OTHERS TO INSTALL GAMES, ONLINE CHAT PROGRAMS OR ANY OTHER SOFTWARE ON THE SUPPLIED COMPUTER. THE PRODUCT WARRANTY MAY BE CANCELED IF THIS OCCURS.

4.0 Technical Specifications

Specification	Value
Photographic coverage	0.5 × 0.5 mm.
Magnification	150-200×.
Working distance	35 mm.
Image processing	automatic/manual.
Database	thousands of patients, virtually unlimited; backup to various media, including USB flash drives.
Power supply	automatic dual voltage, 100-240 V (50/60 Hz).
Power consumption	normal 65 VA, maximum 190 VA.
Dimensions	274 mm × 485 mm × 200 mm (W × D × H).
Net weight	4.600 kg.
Gross weight	7.600 kg.
Package dimensions	1030 mm × 700 mm × 530 mm (W × D × H).

Illustrations - source section 12



SOURCE SECTION 13

5.0 Using HERON Software

5.1 Running the Software for the First Time

At first use, only one fictitious physician is installed, named Physician (Médico).

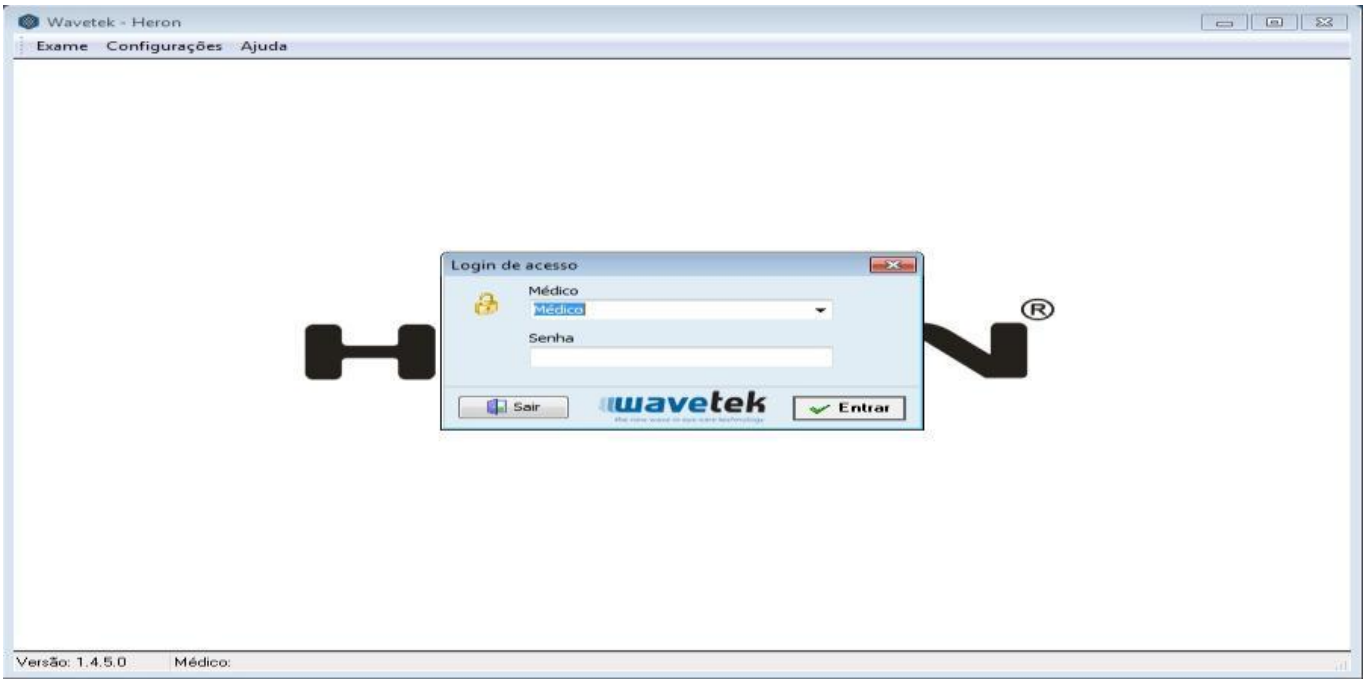
Figure 1.3 - Active physician selection screen.

Select Physician (Médico) on the home screen and click <Enter> (<entrar>) to start HERON. One sample patient, named Paciente Fictício, is also preinstalled.

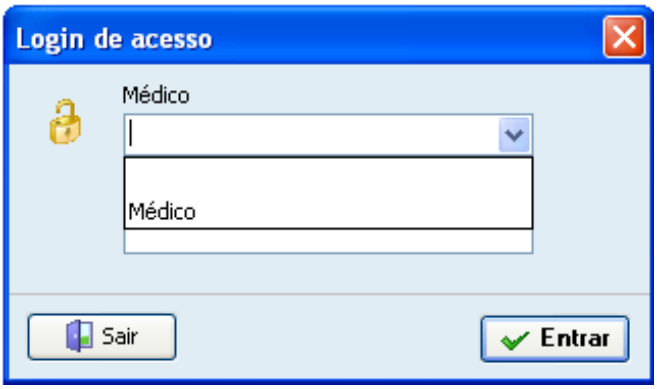
If physicians are already registered, the same screen appears with the complete physician list.

Figure 1.3 - Active physician selection screen.

Illustrations - source section 13



Original instrument or software illustration. See the English instructions and interface labels in this section.



SOURCE SECTION 14

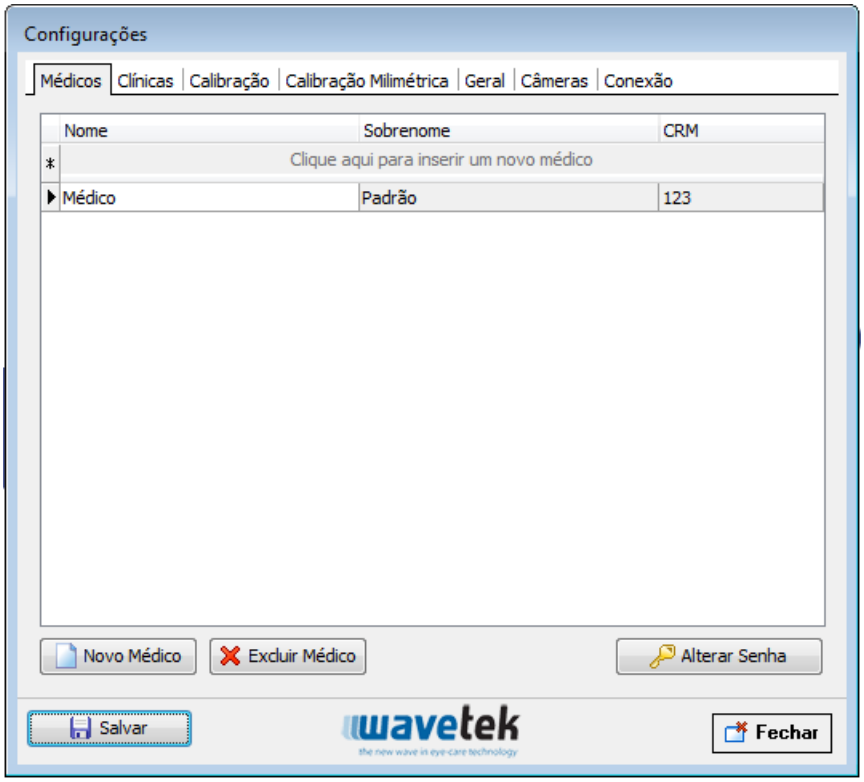
The active physician concept is important. Selecting a physician does not prevent changing that physician during an examination. It means examinations of any new or registered patient are associated with the active physician. Choosing correctly ensures all examinations during that session are associated with that physician, whose name is printed on the patient's reports.

To add a physician, choose <Settings> <Display> (<configurações> <exibir>), click Physicians (Médicos), then New Physician (novo médico) below. Complete the enabled fields and remember to save (Figure 1.4).

Figure 1.4 - Physician addition/removal screen.

Click the adjacent Clinics (Clínicas) tab, then New Clinic (nova clínica), to display clinic data fields and a place for its logo. Click the gray square below Logo (Logotipo) to insert the logo (Figure 1.5).

Illustrations - source section 14



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 15

Figure 1.5 - Clinic registration, data viewing and logo insertion screen.

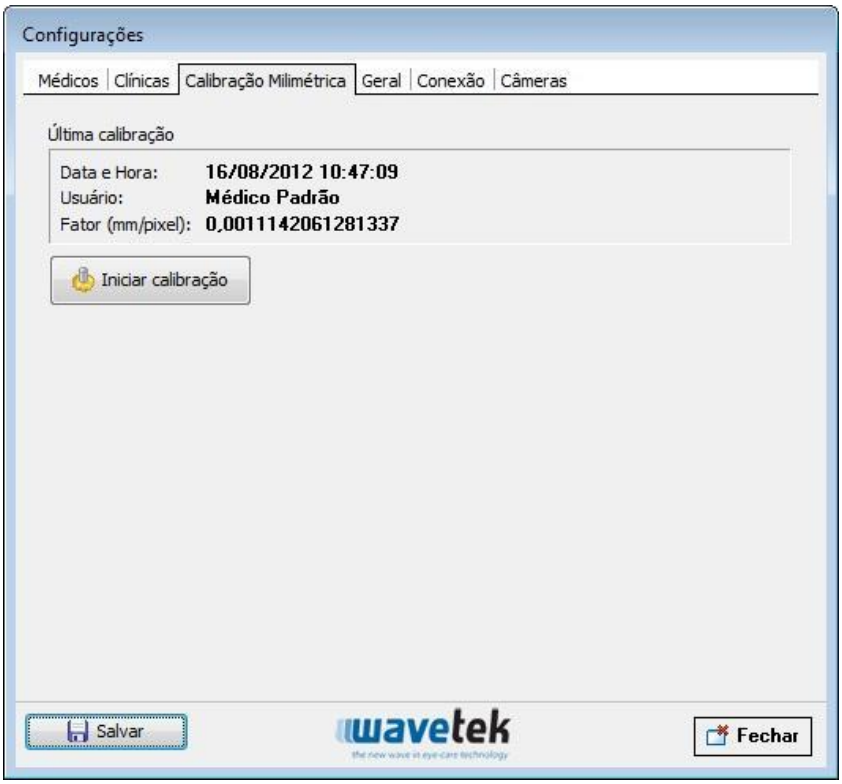
Calibration

WARNING - CALIBRATE HERON ONLY IF YOU HAVE SUFFICIENT KNOWLEDGE. INCORRECT CALIBRATION MAY PRODUCE ERRONEOUS EXAMINATION RESULTS. IF UNSURE, CONTACT AUTHORIZED EVOptica TECHNICAL SUPPORT.

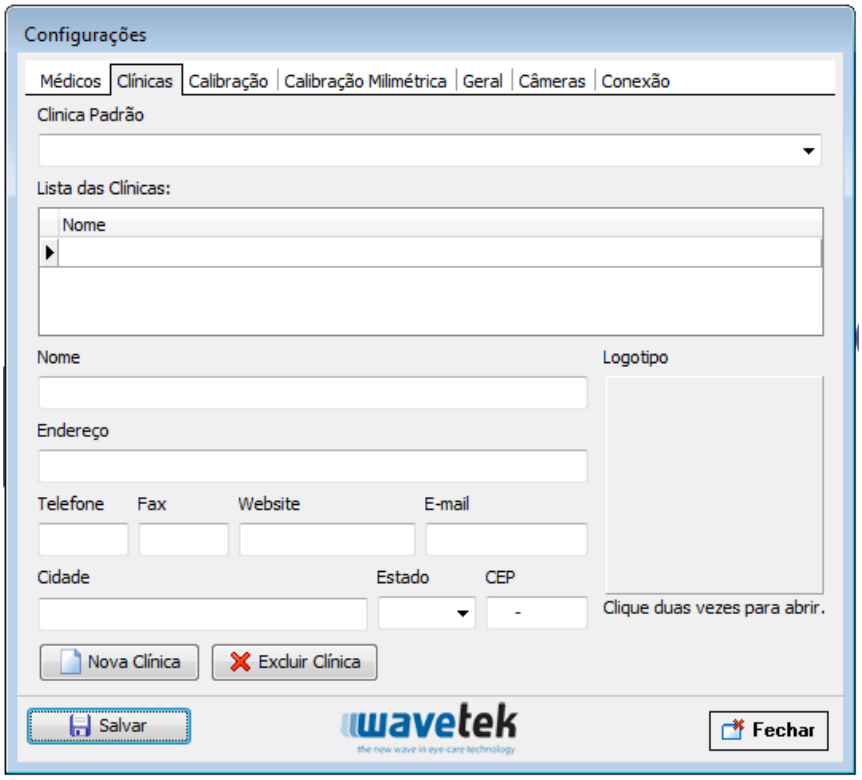
On the Millimeter Calibration (Calibração Milimétrica) tab, click <Start Calibration> (<iniciar calibração>) to begin (Figure 1.6).

Figure 1.6 - Start calibration screen.

Illustrations - source section 15



Original instrument or software illustration. See the English instructions and interface labels in this section.



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 16

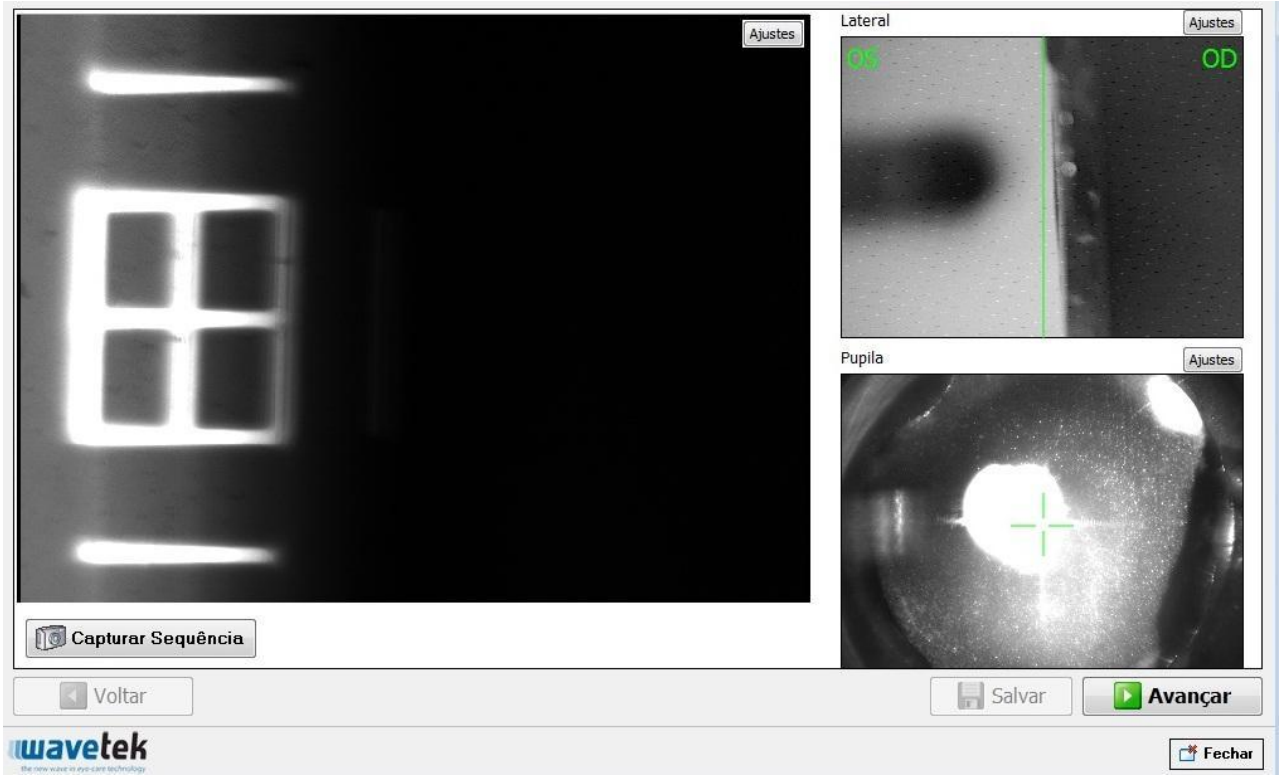
Click <Start Calibration> (<iniciar calibração>) to open the millimeter ruler image capture screen, Figure 1.7.

Figure 1.7 - Millimeter ruler screen.

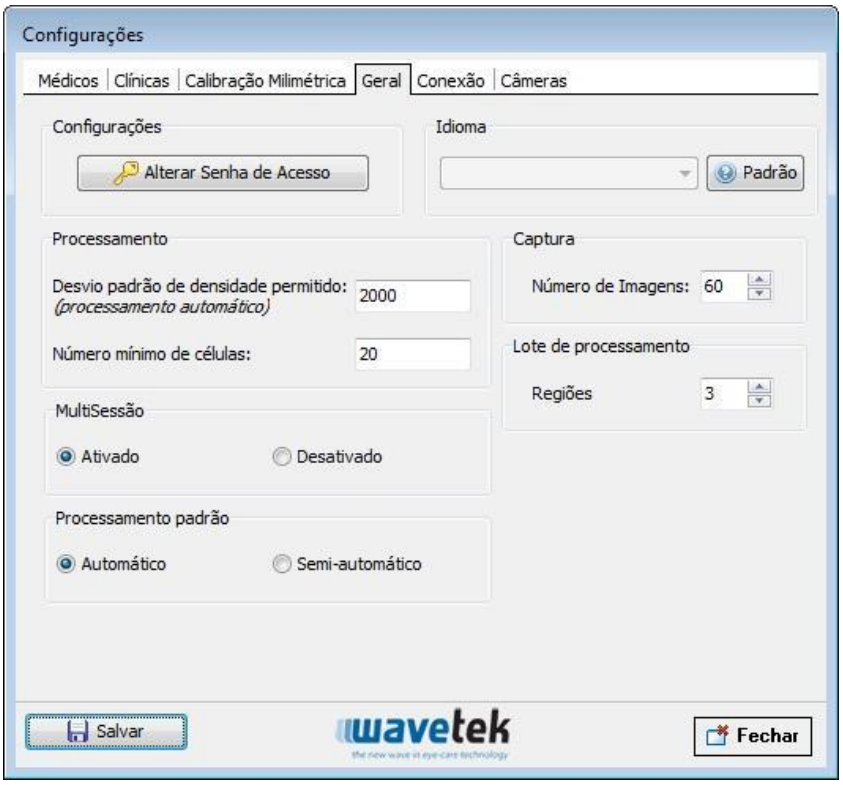
After capturing the ruler image as shown, use the mouse to select a square of the same size. Set Visible Area (mm) (Área Visível) to 0.2. This should produce a calibration value between 0.0009... and 0.001... . Then save the calibration.

Figure 1.8 - HERON general system settings screen.

Illustrations - source section 16



Original instrument or software illustration. See the English instructions and interface labels in this section.



Original instrument or software illustration. See the English instructions and interface labels in this section.

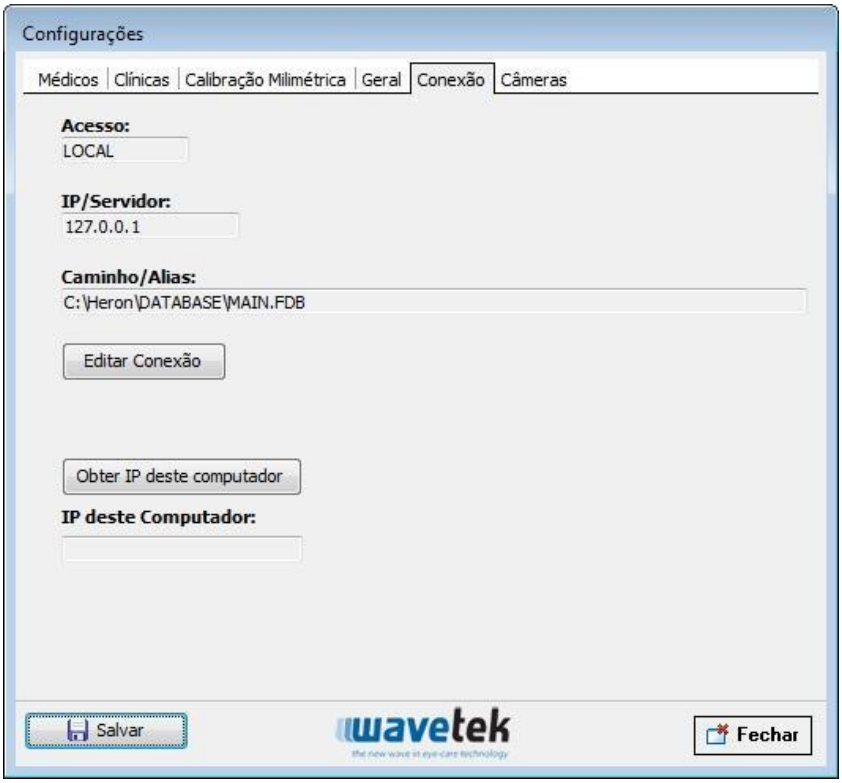
SOURCE SECTION 17

General HERON settings:
1. Change the general screen access password (none by default).
2. Processing (Processamento): precise settings used as calibration and cell processing parameters. Only the manufacturer's technician may change this field.
3. Capture (Captura): number of captured images, 60 by default. Below, select the number of regions analyzed; default is three images.
4. Multisession (Multi-Sessão): enable or disable this system in the software. It is explained further under New Examination.
5. Default Processing (Processamento Padrão): choose automatic (most commonly used) or semiautomatic, where the user selects cells manually.
6. Save the settings.

The connection screen is for HERON Viewer users.

Figure 1.9 - Connection settings screen.

Illustrations - source section 17



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 18

HERON Viewer is a software extension installed on another computer, allowing access to the full HERON database. Computers must be connected over a local network.

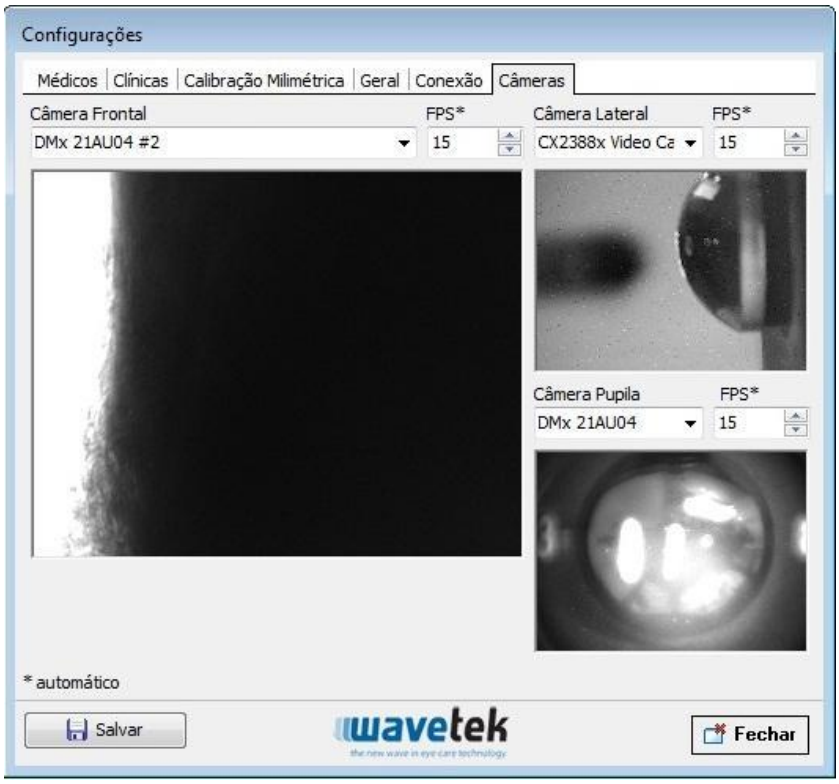
Figure 1.10 - Camera settings screen.

Configure the front, side and pupil cameras here. Click the arrows below Front Camera (Câmera Frontal), Side Camera (Câmera Lateral) and Pupil Camera (Câmera Pupila) to select the correct camera. If unsure, check the camera names in the illustration above. Always click Save (salvar) to save settings.

5.2 Image Capture Techniques in Specular Microscopy Using HERON Focusing

These steps are important for good endothelial cell images:
1. Bright examination environments are not recommended because they can compromise image quality. Place the instrument in a room with adjustable lighting that can be dimmed or made completely dark.

Illustrations - source section 18



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 19

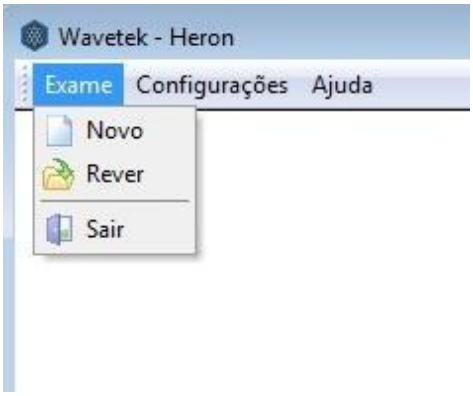
- Always select the examined eye using the external switch. Labels on the instrument indicate the active camera and corresponding eye.
- Align the pupil image first, then the side focusing image, and finally focus the main cell image. The pupil image crosshair should lie over the central LED; the side image line should lie on the corneal apex.
- Capture only after completing these three steps. HERON offers foot-pedal or keyboard capture.

5.3 Preparing HERON for Examinations

Select <Examination> <New> (<exame> <novo>) to open patient registration; see Figure 1.11.

Figure 1.11 - HERON examination home screen.

Illustrations - source section 19



SOURCE SECTION 20

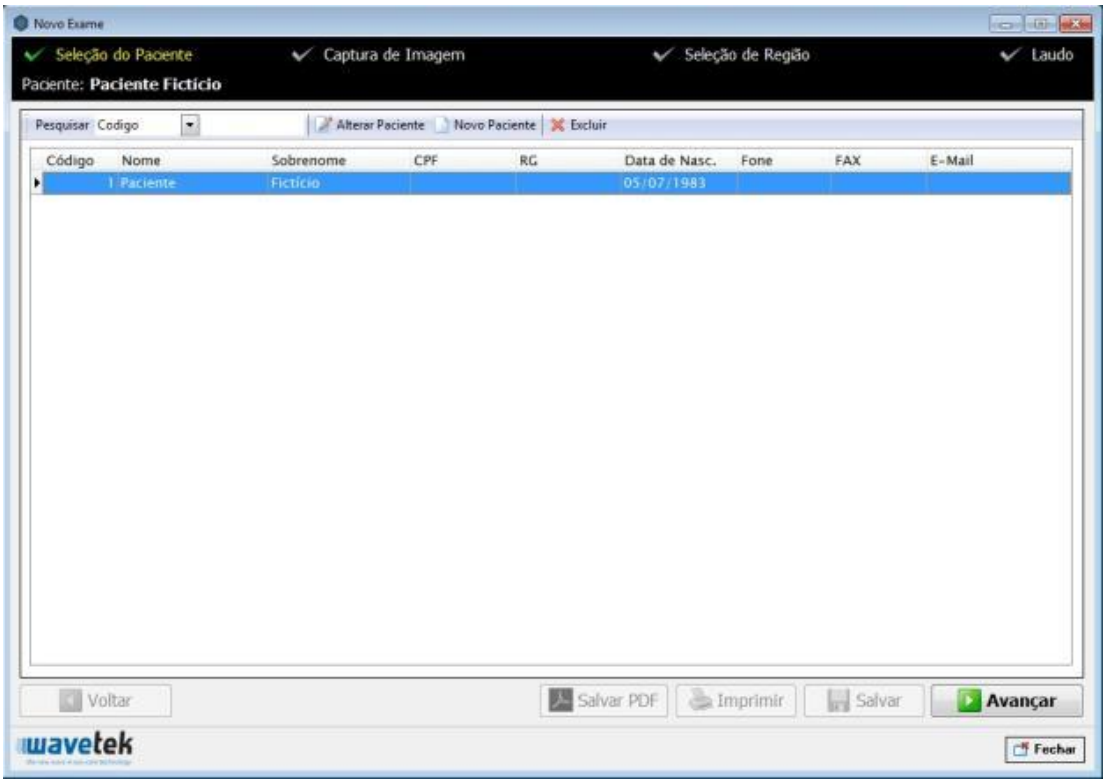
Figure 1.12 - Patient registration and selection screen.

If the patient is not registered, click <New Patient> (<novo paciente>) to open the personal information entry screen. For an existing patient, retrieve the record from the database; do not register again.

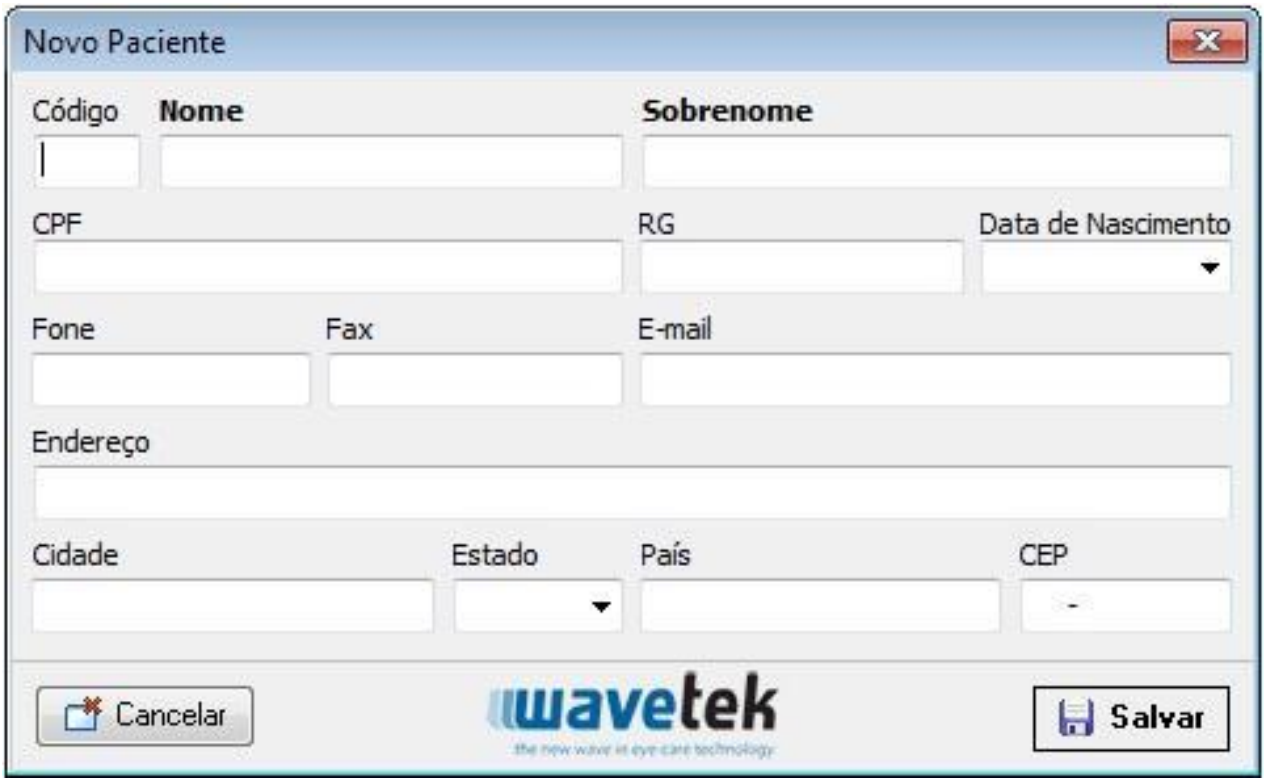
Figure 1.13 - Registration screen.

Note: HERON requires first name, surname and date of birth only. Other fields are optional. After registration click <Next> (<avançar>) to open the Multisession screen.

Illustrations - source section 20



Original instrument or software illustration. See the English instructions and interface labels in this section.



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 21

Multisession Screen

Figure 1.14 - Multisession screen.

Select the corneal regions to examine. HERON allows up to five different regions (Figure 1.14). The central red LED is selected by default.

After selection, click Confirm (confirmar) to enter the capture screen (Figure 1.15).

Figure 1.15 - Capture screen.

Illustrations - source section 21



Original instrument or software illustration. See the English instructions and interface labels in this section.



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 22

Note: Read the following tips before continuing.

5.4 Preparing Patients for Examination

Patients will not know how to position themselves. Explain that they must keep the head correctly positioned and steady, with the forehead firmly against the forehead rest. For better HERON examinations, ask the patient to find a very comfortable position to minimize movement.

The patient must keep the eye wide open during the examination. Before capture, ask the patient to blink several times to lubricate the cornea.

Instrument positioning:
• First observe the patient's eye in the pupil image and use the side image to focus forward or backward.
• When pupil and side images are aligned, a very intense slit light should appear in the central image. Focus the cells by gently moving the instrument sideways, forward and backward (Figure 1.16).
• Be patient while obtaining cell images. Control movement with the joystick so the whole process can be observed on the monitor without losing the slit image (Figure 1.17).
• When these conditions are met, capture the image.
• Starting capture triggers a sequence of endothelial images from which the best image is selected for analysis (Figure 1.18).

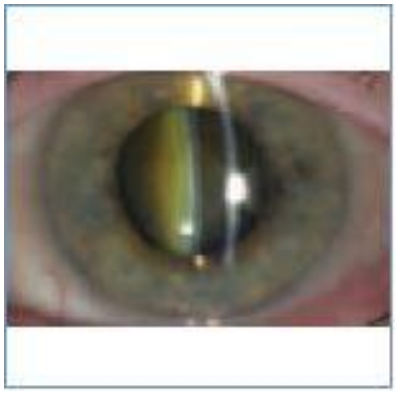
SOURCE SECTION 23

Figure 1.16 - Slit positioned on the patient's eye.

Figure 1.17 - Simulated base movements.

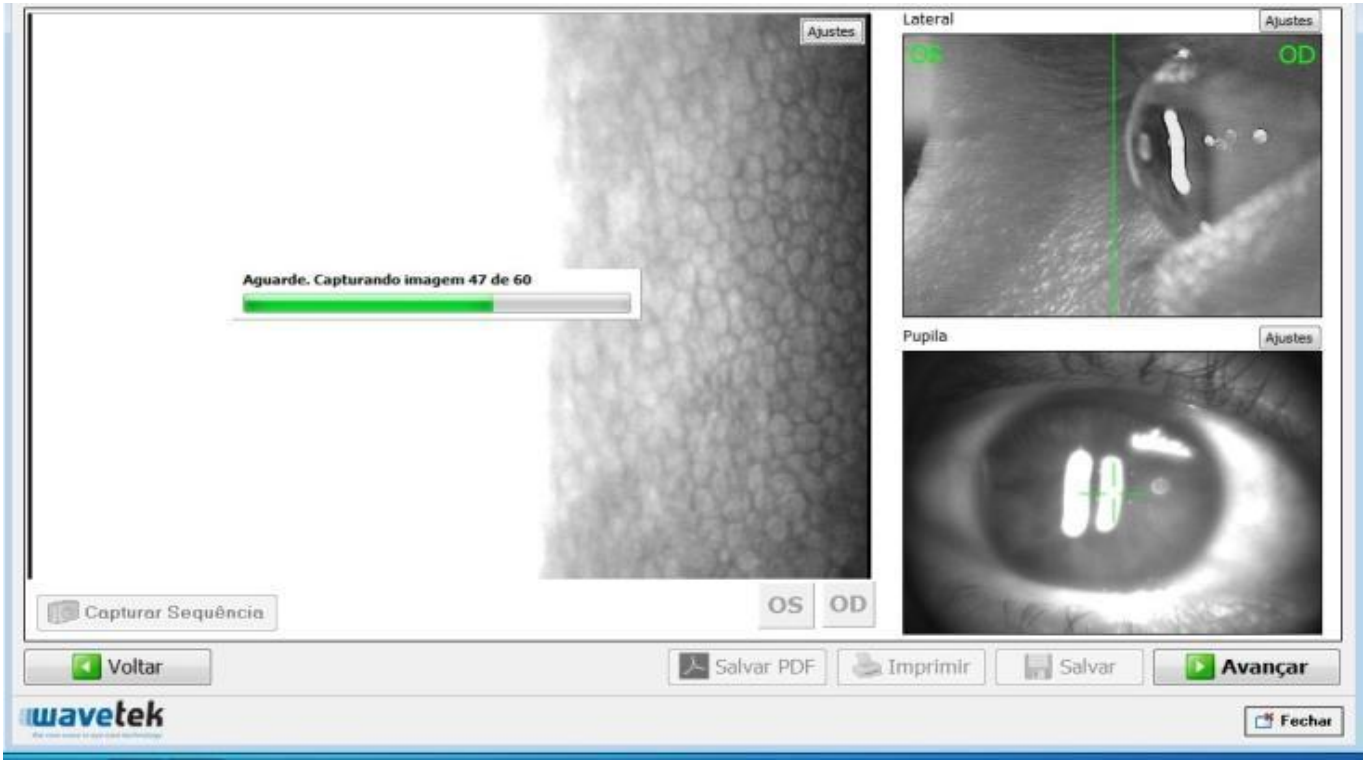
Figure 1.18 - Image capture sequence.

Illustrations - source section 23





Original instrument or software illustration. See the English instructions and interface labels in this section.



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 24

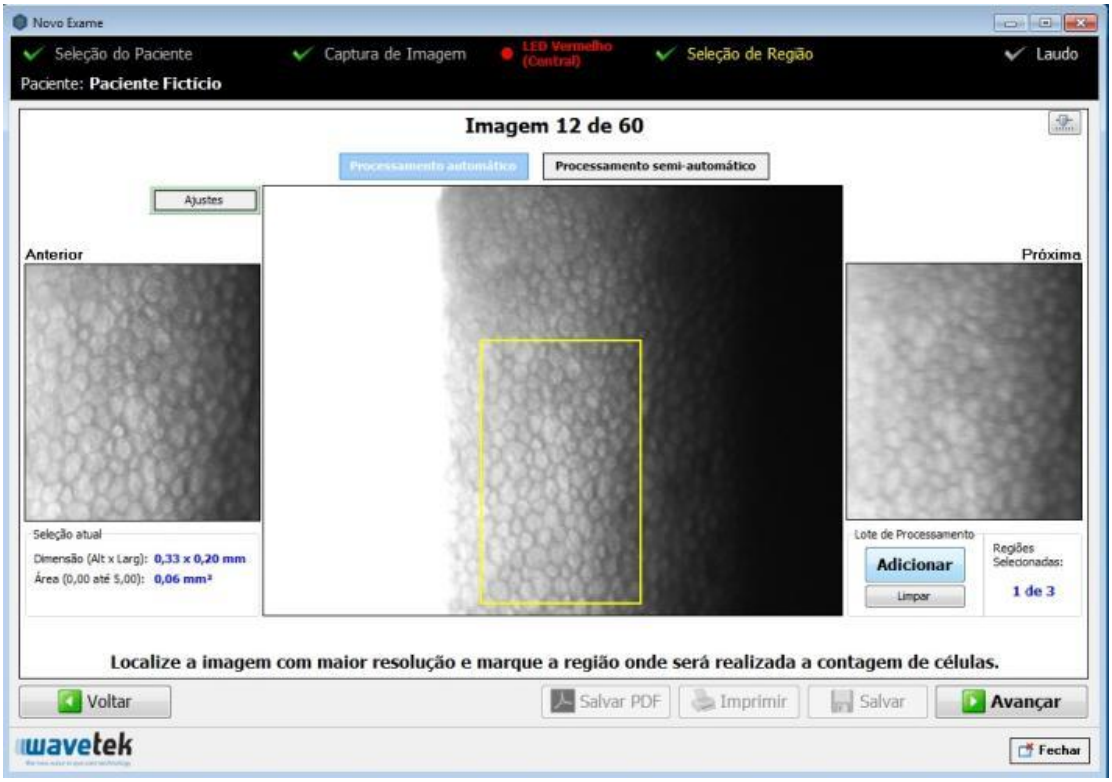
Figure 1.19 - Selecting the best image.

Choose three cell images for analysis. For best results, choose the clearest images with good cell boundary contrast. See Figure 1.20.

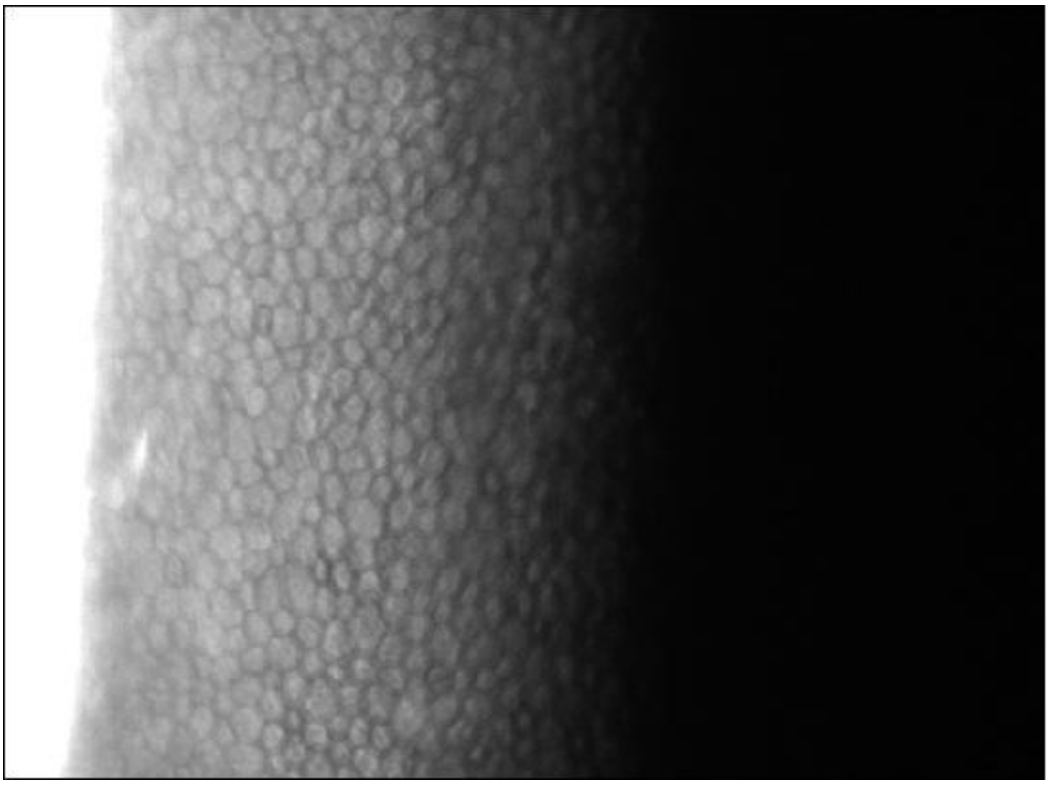
Figure 1.20 - Clear cell image.

After choosing, add the images and click <Next> (<avançar>). HERON counts the cells and generates all graphs...

Illustrations - source section 24



Original instrument or software illustration. See the English instructions and interface labels in this section.



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 25

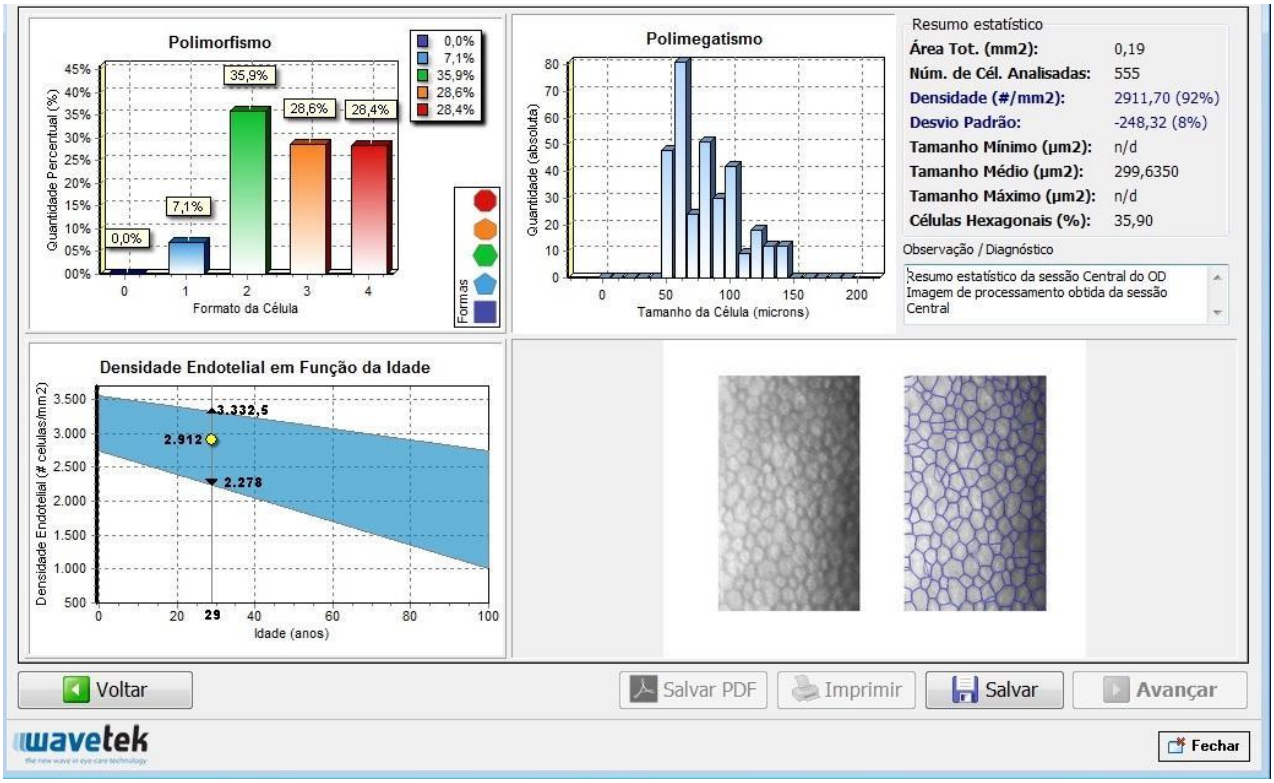
...needed for the medical report. Figure 1.21 shows an example of the cell analysis result.

Figure 1.21 - Analysis results for selected cells (preliminary report).

If results are consistent, click Save (salvar) to store the examination in the system database.

Figure 1.22 - Save examination, notes and eye confirmation (OS, OD).

Illustrations - source section 25



Original instrument or software illustration. See the English instructions and interface labels in this section.



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 26

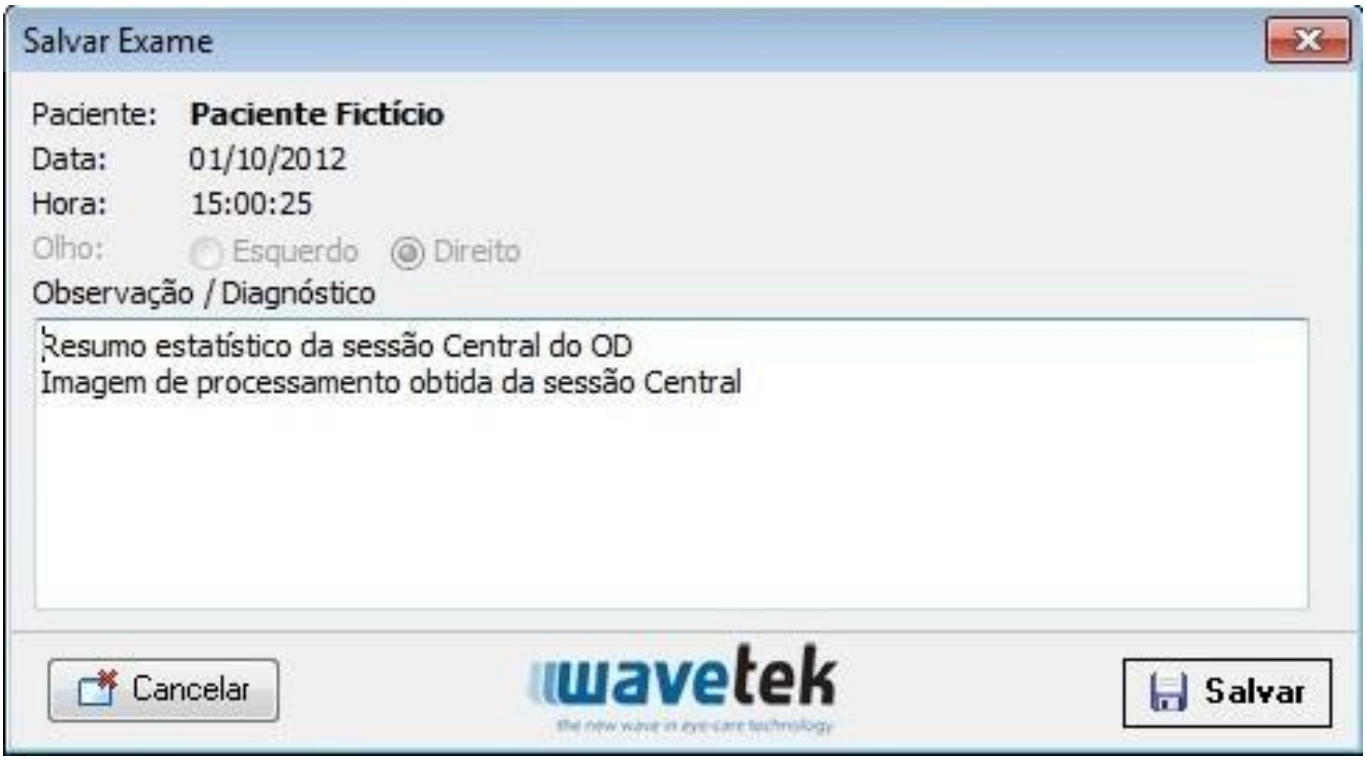
After saving, the system asks whether you want to examine the other eye (Figure 1.23A). Choosing No ends the examination and enables printing and PDF output. PDF reports can be exported via the internet, email or USB flash drive.

If you choose to examine the other eye, the capture screen reopens. Remember to change the instrument's selector switch to the correct eye. Repeat the same capture steps and save the examination.

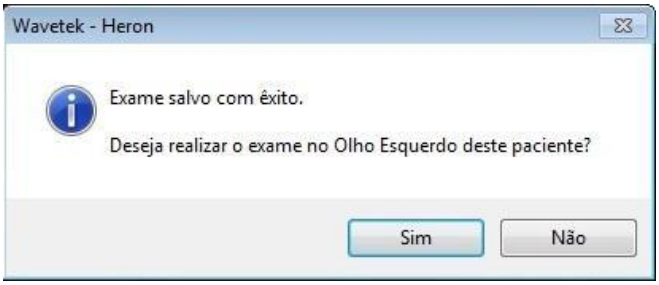
Figure 1.23 - Saving the examination.

Figure 1.23A - Eye selection screen after the first examination.

Illustrations - source section 26



Original instrument or software illustration. See the English instructions and interface labels in this section.



SOURCE SECTION 27

Review Examinations

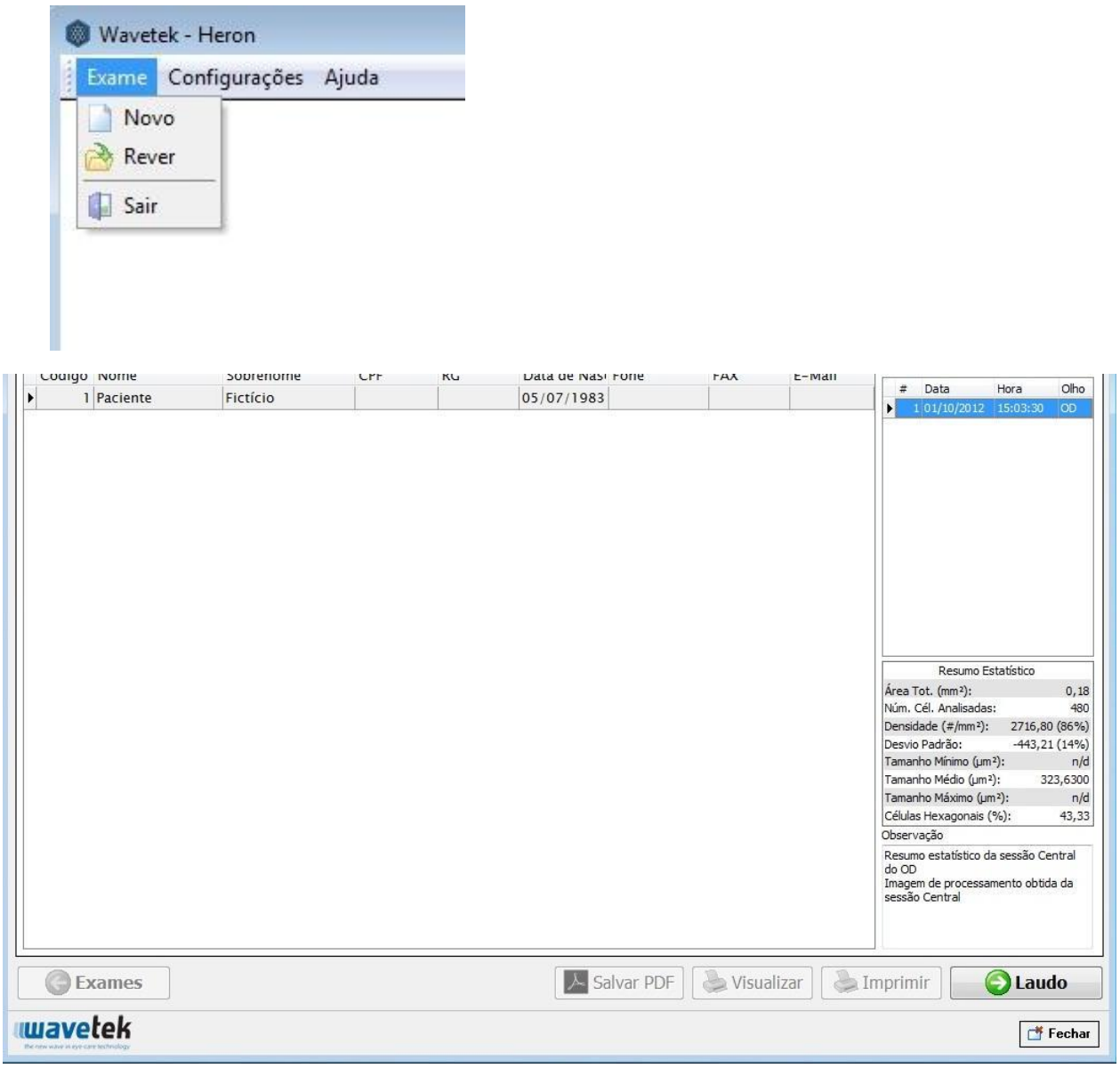
HERON stores all examination information in its database, allowing viewing, printing or PDF generation whenever required. On the home screen click <Examination> <Review> (<exame> <rever>) to open examination review (Figure 1.24).

Figure 1.24 - Examination Review.

Figure 1.24 - Examination review screen.

Select the patient whose examinations you want to analyze again by...

Illustrations - source section 27



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 28

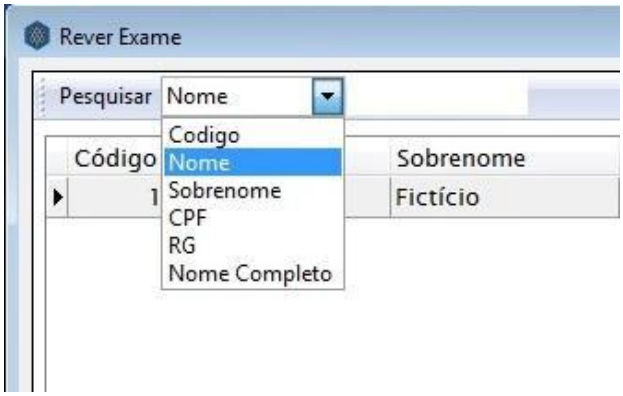
...clicking the patient's name. If the database contains many patients, use the search system at the top (Figure 1.25).

Figure 1.25 - Patient search.

After selecting the patient, select the examination to review. Examinations appear by date, time and eye (OD, OS) at the upper right of the review screen (Figure 1.26).

Figure 1.26 - Examinations.

Illustrations - source section 28





SOURCE SECTION 29

Select the examination and click Next (avançar). The screen displays all stored information: polymorphism and polymegathism graphs, density by age, and other information at the upper right, including area, cell count, density, standard deviation, and minimum, mean and maximum cell size in the selected region.

Examination review allows direct report printing, viewing and PDF export. PDF files can be exported over a network, the internet, or portable media such as USB flash drives and CDs.

Comparison

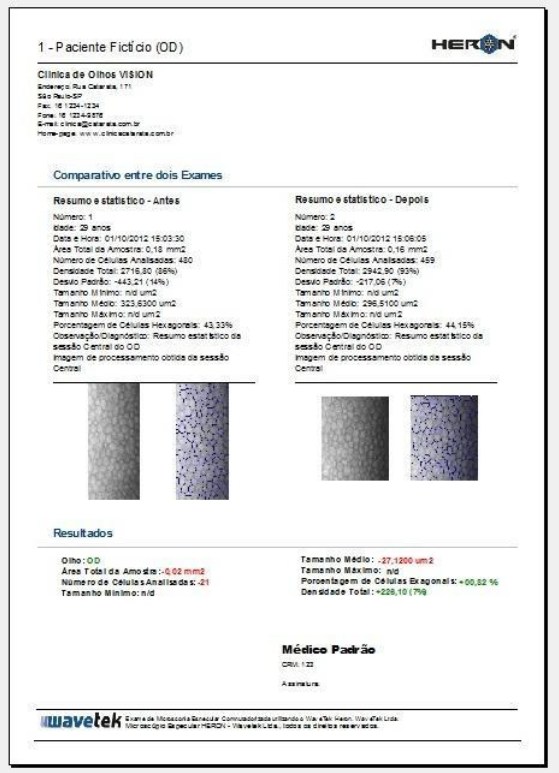
Reports can also be compared during examination review. Click the first examination, hold Ctrl on the keyboard and click the next examination you want to compare. This enables the <COMPARE> (<COMPARAR>) button at the bottom.

For example, compare cell density before and after surgery. HERON can print this result for analysis or export it as a PDF (Figure 1.27).

SOURCE SECTION 30

Figure 1.27 - Comparative report.

Illustrations - source section 30



Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 31

6. Special Conditions for Product Storage, Preservation and Handling

Figure 1.28 - Base of the table supplied with HERON.

Figure 1.29 - On/off and height adjustment buttons.

Illustrations - source section 31



Original instrument or software illustration. See the English instructions and interface labels in this section.



SOURCE SECTION 32

Before Installation

6.1 Packaging

All precautions for transport and storage appear on the packaging using standardized symbols, illustrated below.

Symbol	Description
Fragile	Handle carefully during transport and storage.
Maximum stack: 2	No more than two identical units may be stacked one above the other.
Keep dry	Protect against moisture during transport and storage.
This way up	Package orientation during transport and storage.
Temperature limits	0°C to 55°C during transport and storage.

Figure 1.30 - Packaging precautions.

6.2 Storage

Keep the product in its original packaging, protected from moisture and excessive heat. When storing multiple packaged instruments, stack no more than two units, as indicated by the symbol.

6.3 Transport

Avoid vibration, drops and direct package impacts. Fragile product. Handle the unpackaged instrument very carefully to prevent accidental damage.

During transport and storage, ensure: ambient temperature 0°C to +55°C; relative humidity 0% to 90%; atmospheric pressure 375 to 795 mmHg.

Illustrations - source section 32

Simbologia	Descrição
	Frágil. Cuidado no transporte e armazenamento.
	Número máximo de empilhamento. No máximo 2 unidades idênticas podem ser empilhadas uma sobre a outra.
	Necessita de proteção contra umidade no transporte e armazenamento.
	Sentido para cima. Posicionamento da embalagem durante o transporte e armazenamento.
	Limite de temperatura (0 a 55°) para o transporte e armazenamento.

Original instrument or software illustration. See the English instructions and interface labels in this section.

SOURCE SECTION 33

After Installation

6.4 Placement

Protect the product from moisture, excessive heat and direct sunlight. During placement and operation ensure: ambient temperature +10°C to +35°C; relative humidity 30% to 75%; atmospheric pressure 375 to 795 mmHg. The original source labels the first two ranges “transport and storage” within this operating-placement section.

6.5 Preservation

After examinations, clean with a soft cloth lightly moistened with alcohol. Do not introduce or spill liquids inside. Do not use organic solvents or chlorine-releasing cleaning products. Keep in a clean, dust-free location.

7 Warnings and Precautions

7.1 User Warnings and Precautions

Only qualified, trained personnel under a qualified medical team familiar with the known risks and benefits of specular microscopy may use this instrument.

7.2 Explosion Hazard Warnings and Precautions

The HERON Specular Microscope is unsuitable for use around flammable anesthetic gases or other flammable materials, including certain cleaning products. Do not use it in areas where an explosion hazard may exist.

SOURCE SECTION 34

7.3 Electrical Hazard Warnings and Precautions

Verify that the outlet has a correctly installed protective earth connection for proper operation and safety, in accordance with the applicable ABNT technical standard referenced in the source.

At the end of work, always switch off using the main switch before unplugging. This avoids possible overload at the next startup.

If power fails or a fuse blows, turn off the main switch so that a surge when power returns cannot damage the instrument.

Replacement fuses must have the same manufacturer-specified type and rating to maintain electrical protection. Before replacing a fuse, turn off the on/off switch and unplug to prevent electric shock.

Do not use the power cord if any part is pinched or its insulation damaged.

7.4 Transport and Storage Warnings and Precautions

Store and transport stacked no more than two units high, under excellent climatic conditions. Protect this fragile instrument from impacts. Avoid transporting it, as this can cause image capture failures or errors.

7.5 Maintenance Warnings and Precautions

Do not attempt to repair or replace defective or inoperative components with similar parts from other instruments. Only EVOptica and its authorized distributors may repair with original parts and guarantee correct operation.

SOURCE SECTION 35

7.6 Cleaning Warnings and Precautions

Switch off HERON, then disconnect from the electrical supply before cleaning. Do not use high-pressure or steam cleaning, agents releasing chlorine and/or peracetic acid, chemical-process wet cleaning agents, or abrasive substances. It is essential to keep the instrument clean and disinfected after every medical procedure.

8 Product Performance

8.1 Indication and Intended Use

Indication: assists ophthalmic medical professionals in diagnosing vision problems. Particularly useful for preoperative and postoperative ophthalmic assessment, including transplantation, refractive surgery and cataract surgery.

Purpose: count corneal endothelial cells from photographic images. The examiner defines the counting area, and the instrument then provides cell density in the tissue.

8.2 Unwanted Secondary or Adverse Effects

Not applicable to this product.

8.3 Product Safety and Effectiveness

HERON was designed and developed with nontoxic materials and rigorous technical quality standards for user safety and functionality. According to the original manual, when used as instructed it will not cause problems or lose or change its physical and dimensional characteristics.

SOURCE SECTION 36

9 Installation or Connection to Other Instruments

9.1 Important Recommendations

Do not alter the original factory configuration: the instrument is calibrated and tested at the factory to reach the user in proper operating condition. Do not allow installation of games, chat programs or any other software on the supplied computer; doing so voids the warranty.

WARNING: Using any part, accessory or material with this instrument that is not specified by the manufacturer is entirely the user's responsibility, NOT the manufacturer's.

10 Troubleshooting

Problem	Possible cause	Solution
Image is out of focus	the HERON microscope is not correctly seated on the slit lamp base.	Check the base fitting and ensure the HERON microscope is firmly secured.
Image is out of focus	Play in the locating key that defines the 35-degree angle.	Verify that the locating key is secure and the HERON microscope has no mechanical play in its fitting.
No separation of corneal layers	Possible slit lamp misadjustment.	Check the slit lamp properly before starting microscopy.
No separation of corneal layers	Possible defect in slit lamp focusing.	Contact the manufacturer or a specialized technician for slit lamp maintenance.
No image	Possible lack of power at the power supply.	Check outlets, power supply and their rated voltages.
No image	Possible poor contact in communication cables.	Disconnect and reconnect all cables attached to the HERON microscope, or exit HERON and reopen it.
Image does not process	Insufficient brightness and contrast during capture, or insufficient slit illumination.	Adjust software brightness; increase slit light brightness or select an area where cells are more clearly visible.
No capture	Poor contact in the foot-pedal cable.	Disconnect and reconnect the foot-pedal cable.

Figure 1.31 - Possible problems table.

SOURCE SECTION 37

Note: If the problem is not solved as described in the preceding table, contact authorized EVOptica technical support immediately.

11 Precautions if Product Operation Changes

If the instrument becomes hot, makes unusual noises or operates abnormally, check whether the problem corresponds to section 10, Troubleshooting. If it cannot be solved, immediately switch off, unplug the power cord, then contact authorized EVOptica technical support for assessment and repair.

12 Instrument Cleaning Procedure

12.1 Lens and Reflecting Mirror Cleaning

Remove adherent dirt from lenses or the reflecting mirror with a small soft-bristled brush. If traces remain, use a small piece of cotton moistened with isopropyl alcohol.

12.2 Sliding Plate, Rails and Shaft Cleaning

Accumulated dirt on the sliding plate, rails or shaft can impair horizontal and vertical instrument movement. Clean them frequently with a clean, soft cloth.

12.3 Cleaning and Disinfecting Plastic Parts

Clean plastic parts such as the chinrest support and forehead rest with a soft cloth moistened with water and neutral detergent, then disinfect with medicinal alcohol.

13 Sensitivity to Environmental Conditions During Normal Use

HERON Specular Microscopes were specifically designed to avoid sensitivity to electromagnetic interference, external electrical influences, electrostatic discharge, and pressure and temperature variations.

SOURCE SECTION 38

To achieve this, transport, install, handle and preserve the instrument according to this manual.

14 Precautions When Taking the Product Out of Service

To prevent environmental contamination or misuse when the product is no longer usable, segregate, package, identify and send it, at the customer's expense and risk, to EVOptica's designated facility for safe disposal.

15 Product Packaging

HERON is supplied in a cardboard box with expanded polyurethane internal lining covered in high-density polyethylene film. Dimensions are detailed under Technical Specifications.

16 Statement of Responsibility

In the original source, Wavetek Indústria Comércio Importação Exportação de Produtos Médicos e Ópticos Ltda., represented by technical officer Elizeu Ramos and legal representative Luis Alberto Vieira de Carvalho as signatories, assumed full technical and legal responsibility and declared all information about the "CHROMA Corneal Analyzer" in these Instructions for Use true. Source discrepancy: this HERON manual's original responsibility statement names CHROMA.

17 Warranty Terms

The original manufacturer offered a 12-month warranty against material and/or manufacturing defects, beginning on the invoice date. The warranty is voided by:
1. Failure to follow this manual's transport, installation, use and maintenance instructions.
2. Accident, dropping, improper installation or other damage caused by misuse or natural agents.
3. Breaking the safety seal, repairs, modifications or alterations to the instrument or its parts by unauthorized personnel.

After the warranty period...

SOURCE SECTION 39

...all service, parts and expenses are charged according to prevailing company policy.

For further information, usage tips, operating problems or questions, visit https://evoptica.com, email contact@evoptica.com, or call/text +1-315-210-8976.

18 References

- Abib, FC, Microscopia Especular de Córnea com Validade Estatística e Reprodutibilidade, Editora Cultura Médica, 1998.
- http://bdtd.bce.unb.br/tedesimplificado/tde_busca/arquivo.php?codArquivo=3020
- http://www.abonet.com.br/abo/652/abo65214.htm
- http://buscatextual.cnpq.br/buscatextual/visualizacv.jsp?id=K4728676D4
- http://www.scielo.br/scielo.php?pid=S0034-72802007000500006&script=sci_arttext

19 Acknowledgments

The original development team thanks everyone, both individuals and professionals, who believes in and supports Brazil's optical industry and especially helps make it viable in this highly competitive technology sector. Particular thanks go to Professors Dr. Harley Bicas, Dr. Paulo Schor, Dr. Augusto Paranhos, Dr. Wallace Chamon, Dr. Claudio Lottenberg, Dr. Jarbas Caiado de Castro, Dr. Fátima Yasuoka and Dr. Liliane Ventura.

For direct contributions to HERON development, thanks to Eng. Elizeu Ramos, Eng. Paulo Raymundo, Juliana Arai, Ricardo Arai, Valéria Mellaci, Cássio Costa, Roseane Maggiotto, Maurício Lima and the entire ParqTec design team, especially Eng. MSc Marcos Brefe and designers André Mozeto and Adeline Gil. We acknowledge the enormous contribution of physicist Vitor Oliveira, always determined and available to...

SOURCE SECTION 40

...help us, without whom development and delivery of this instrument to Brazilian physicians' clinics would have taken much longer.

20 Notes

Configuration and source-review notes

Source limitations requiring technical review

Source section 6: QA correction applied: restored section-number identifiers in original contents on pages 6-7 after list conversion had removed them. English layout must regenerate its own contents.

Source section 11: Manual headers identify HERON PLUS, but product model states WAVETEK HERON 2.0. Original ANVISA registration field is blank. Original Brazilian corporate/professional identifiers are historical, not current EVOptica US clearance.

Source section 12: Manual dimensions 274 × 485 × 200 mm, net 4.600 kg/gross 7.600 kg and 100-240 V differ from HERON brochure dimensions 350 × 350 × 280, 6.0 kg and 110-240 V. Treat as different unresolved source configurations.

Source section 16: Calibration range is printed incompletely as 0.0009... to 0.001... and Visible Area 0.2. Ellipses retained; no more precise limit inferred.

Source section 17: Capture defaults retained as 60 images and 3 selected regions/images; page 21 permits five corneal regions. Brochure states a sequence of up to 100 images, a separate historical configuration claim.

Source section 32: Recovered and translated all five packaging-symbol rows from local OCR/source PNG. Source blank page 2 retained.

Source section 33: Placement section calls operating temperature/humidity ranges 'transport and storage.' +10-35°C/30-75% and transport/storage 0-55°C/0-90% retained separately.

Source section 36: All eight troubleshooting cause/solution rows retained; source table refers to slit-lamp mounting and 35° locating key although this document describes noncontact HERON. Hardware applicability requires manufacturer confirmation.

Source section 38: Responsibility statement wrongly identifies the CHROMA Corneal Analyzer in the HERON manual. Preserved as an explicit source discrepancy, not silently reassigned.

EVOptica

Ophthalmic instruments. Science, engineering and experience connected.

Contact sales, distribution and product support

evoptica.com

contact@evoptica.com

Call or text +1-315-210-8976

221 S Main St
Fairport, NY 14450
United States

Explore HERON PLUS resources

Request a demonstration or quotation

Configuration and market information

US regulatory clearance is in progress. The original ophthalmic product line held clearances in South American markets. Contact EVOptica for the product configuration, documentation and availability relevant to your destination market.

This is a full English technical-review edition of the supplied source document. It preserves source procedures, warnings, values and unresolved source differences. It is not a manufacturer-released clinical IFU for a new US product configuration.

Document information

English EVOptica edition: 05 November 2026.

Source revision: Rev03

Original technical illustrations are retained for traceability. Some legacy interface screenshots show Portuguese controls; English instructions and label glossaries accompany them. Product and software names are retained. Third-party marks identify their respective owners.