



EUROPattern

Computer-aided immunofluorescence microscopy (CAIFM)



- Fully automated microscopy and modern diagnostics at the computer screen (cell substrates, tissues and EUROPLUS antigen dots, also in mosaics)
- Pattern recognition for ANA, ANCA, AMA, anti-LKM (LKM-like) and mixed patterns based on deep convolutional neural networks, and calculation of titers
- Classification of results as positive or negative for Crithidia luciliae, antigen-expressing cells and EUROPLUS antigen dots
- Fast processing (13 seconds per image) and consolidation of results per patient for paperless diagnostics
- Digital archiving of fluorescence images and reports
- Bidirectional data exchange with the laboratory information system (LIS)

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Modern technology from the experts

- Magazine for 500 fields (A)
- Automated slide supply
- DataMatrix code reader
- Controlled (c)LED for >50,000h constant light intensity (B)
- High-resolution cameras
- Precise optical system
- Up to 3 different autofocus objectives 3D manual control
- RealDrive manual control (C) (optional)
- Oculars (optional)



AA



BBBB



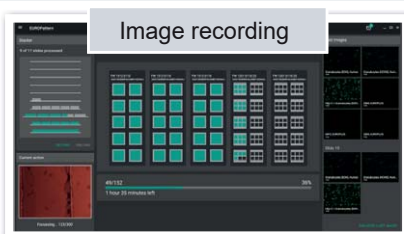
C



Paperless generation of result reports in three steps

User-friendly software

1



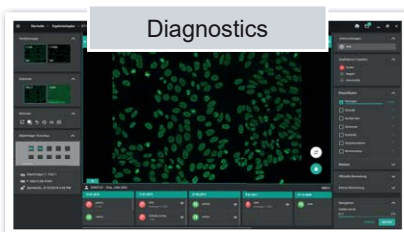
After the initiation, the EUROPattern Microscope automatically takes subsequent fluorescence images of all slides. The fluorescence images can be viewed immediately and checked at the screen, while the microscope continues recording the images. The captured images are classified as positive, negative or borderline and the patterns identified, in case of ANA and ANCA, by means of deep learning processes using deep convolutional neural networks.

2



Negative samples are displayed in a clear scroll-down list and can be verified rapidly and reliably all together, taking into account the counterstaining, with a single mouse click. For strongly positive samples the software also suggests individual dilution series for subsequent analyses.

3



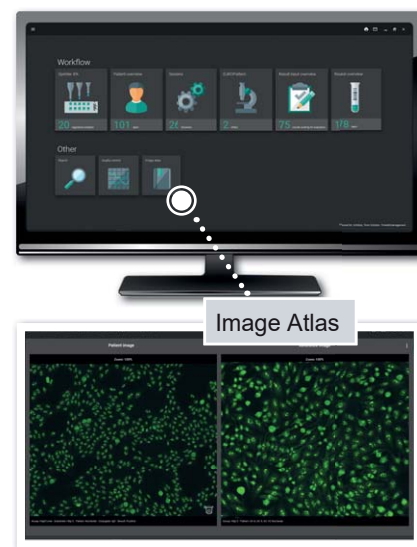
Positive and borderline samples are afterwards displayed for each patient, and all individual results are compiled in an overview. The user can directly confirm the suggested patterns and titers by mouse click, or, if necessary, edit them – the competence remains with the user.

The entire process can be performed completely paperlessly, from the creation of worklists, to diagnostics and archiving of fluorescence images and results. Results from former analyses are shown in a clear patient history.



More practice-oriented functionalities

- The intelligent management of all data and results as well as the bi-directional communication with the LIS and the instruments takes place with the laboratory management software EUROLabOffice 4.0.
- Very quick focussing, image recording and digital evaluation (13 seconds / image) allow for the system to be integrated into the workflows of the largest laboratories. Diagnosis suggestions can be already verified during the automated microscopy process.
- Via mouse click, the sample field can be automatically approached and manually microscopied in the live mode. In order to prevent fading of the fluorescence, the cLED turns itself off when inactive.
- Automated photographing of tissues for subsequent visual diagnostics at the screen and archiving is also possible.
- By using the EUROLabOffice 4.0 Image Atlas, recorded fluorescence images can be annotated and saved as a reference or for study purposes by one mouse click.



Fluorescence standardisation

- Constant illumination due to the built-in fluorescence standard
- Unique automated calibration of the microscope



Excellent agreement between CAIFM and conventional evaluation

- Allocation of the samples to the corresponding results is ensured through the DataMatrix codes of the slides. The slides can be loaded in any order.
- Focussing in transmitted light prevents the fluorescence from fading.
- The counterstaining enables a reliable quality control of all fluorescence images during diagnostics.
- The controlled EUROIMMUN cLED guarantees standardised excitation light and reproducible fluorescence emissions.
- The integrated fluorescence standard calibrates all EUROPattern microscopes for comparable IIFT images.
- The computer-aided evaluation can be adjusted to the local diagnostic standards with respect to the patterns (e.g. sensitivity).
- Reliable support, both technical and scientific, is ensured. In the case of unclear findings, the user can automatically provide the EUROIMMUN support team with all required data in anonymised form for quick and targeted support.

ANA pattern		Identified pattern (automatic pattern recognition)	
	n	n	%
Homogen.	15	14	93.3
Granular	12	11	91.7
Nucleolar	11	11	100
Centromeres	10	10	100
Nuclear dots	10	9	90
Cytoplasmic	22	22	100
DFS	20	100	100
Nucl. membr.	13	13	100
ANA neg.	79	75	94.9
Total	192	185	96.4

EUROPattern n = 171		Visual evaluation	
		Positive	Negative
Positive		92	4
Negative		0	75
Agreement		97.7 %	
K value		0.95	
Sensitivity Specificity		100 %	
Pos. prediction value		94.9 %	
Neg. prediction value		95.8 %	
		100 %	



Computer-aided IIFT evaluation using EUROPattern Classifier

Pattern recognition based on deep convolutional neural networks

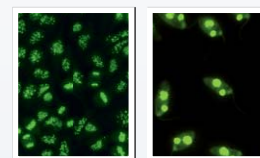
EUROPattern Classifier automatically generates result suggestions, including titer calculations, for a continually increasing number of substrates. This initially involves classification of the detected fluorescence patterns by means of deep convolutional neural networks, a deep-learning method. Finally, all the individual findings obtained with the substrates and dilutions are consolidated into a final result for each patient.

ANA diagnostics

■HEp-2/HEp-20-10 cells: Automatically generated pattern and titer suggestions with confidence values for nine fluorescence patterns according to ICAP* (homogeneous, speckled, dense fine-speckled, nucleolar, nuclear dots, centromeres, nuclear membrane, AMA and cytoplasmic) and any combinations thereof

* International Consensus on Antinuclear Antibody (ANA) Pattern

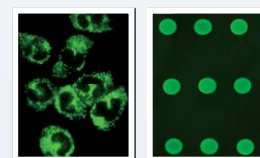
■Crithidia luciliae: Automated positive–negative classification and titer suggestions based on the specific kinetoplast fluorescence for the detection of anti-dsDNA antibodies



ANCA diagnostics

■Granulocytes: Automatically generated pattern and titer suggestions with confidence values for the fluorescence patterns pANCA, cANCA and atypical ANCA

■EUROPLUS antigen dots: Automated positive–negative classification of the monospecific antigen fluorescence for confirmation and for differentiation from other diseases

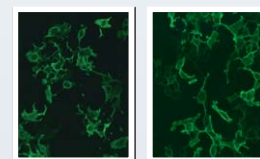


Diagnostics based on antigen-expressing cells

■Neurology: Automated positive–negative classification and titer suggestions with confidence values for different antigens, e.g. AMPA 1/2, NMDAR, GABAR B1/B2, LGI1, CASPR2, DPPX, gephrin-4 and MOG

■Nephrology: Automated positive–negative classification and titer suggestions with confidence values for the antigen PLA2R

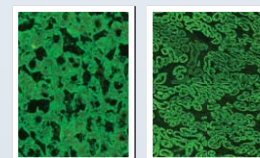
■Infection diagnostics: Automated positive–negative classification and titer suggestions with confidence values for the antigens EBV-CA, EBV-EA and EBNA-1



Diagnostics of autoimmune liver diseases

■Liver (rat): Automated positive–negative classification for relevant ANA and identification of anti-LKM-like patterns ("LKM-like", is given as "anti-LKM" pattern after a confirmatory result on non-kidney tissue)

■Kidney (rat): Automated positive–negative classification for AMA, specific for primary biliary cholangitis, and identification of anti-LKM-like patterns ("LKM-like", is given as "anti-LKM" pattern after a confirmatory result on liver tissue; suspected autoimmune hepatitis type 2)



Scope of delivery

■EUROPattern Microscope (incl. cameras, cLED, DataMatrix code reader, 20x objective, 3D manual control)

■ Optional: oculars, 10x objective, 40x objective, RealDrive manual control

■Magazine and carrier for automated slide loading (500 fields)

■PC system incl. control software for the EUROPattern Microscope, high-resolution screen

EUROPattern Classifier pattern recognition and result input software

■EUROLabOffice 4.0

Technical data

■Breadth x depth x height: approx. 51 cm x 66 cm x 85 cm

■Weight: approx. 82 kg

■Power supply: 110–240 V, 60 W, 50/60 Hz

■cLED light source for transmission light fluorescence microscopy

Constant excitation light source (460 – 490 nm)

■LED light source for transmitted light focussing

■ Constant light source (620–630 nm)

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