

Shaping the future of automated IFA diagnostics

Euroimmun (part of Revvity) has been at the forefront of innovation in indirect immunofluorescence assay (IFA) diagnostics for nearly 40 years. CLI spoke with Dr Jörn Voigt, Head of IT and responsible for software and application in IFA, about Euroimmun's latest advances in IFA automation and how they can help laboratories meet growing diagnostic demands.



EUROPattern Microscope 2.0

Firstly, why is IFA so challenging for labs?

Laboratories today face increasing pressure from staff shortages while demand for IFA testing continues to rise. Traditional manual slide incubation requires skilled personnel who can perform each procedural step accurately and consistently. Reliable microscopic evaluation of the fluorescence patterns also depends heavily on operator expertise and experience. In addition, the subjective nature of interpretation can result in variability in reporting between technicians and across laboratories.

To help laboratories overcome these issues, Euroimmun has pioneered a broad range of automation solutions over the decades, enabling our customers to stay ahead of their increasing workloads while maintaining high diagnostic quality.

What are Euroimmun's key technologies for IFA?

Our groundbreaking technologies for IFA include BIOCHIP Mosaic slides, TITERPLANE Technique, MERGITE wash technology, LED-based microscopy and AI-enhanced evaluation software, among others.

Since their introduction – from the 1980s through to the present day – each of these proprietary technologies has contributed significantly to improving the efficiency, standardization and reliability of IFA workflows. Importantly, these innovations remain state of the art and continue to form the foundation of our most advanced automation solutions.

How do these innovations streamline IFA analysis?

Our BIOCHIP Mosaic technology combines miniature sections of different cell, tissue and antigen-dot substrates within the reaction fields of a microscope slide. This enables simultaneous analysis of multiple substrates, generating comprehensive antibody profiles for minimal hands-on effort.

The TITERPLANE Technique is a gravity-assisted incubation technology that prevents evaporation and artefact formation while ensuring a synchronized start of all reactions. MERGITE technology provides

controlled liquid flow during slide washing, minimizing the risk of cross-contamination and protecting the delicate substrates from damage.

The autoregulating long-life LED illumination system is a core feature of all our IFA microscopes. It provides consistent signal intensity at low power consumption, improving both reproducibility and cost-efficiency. Our microscopes also incorporate high-resolution cameras with laser autofocus technology, enabling exceptionally fast image acquisition. System performance is verified by daily automated checks using a fluorescence standard that standardizes light brightness, and a focus standard that maintains focusing accuracy.

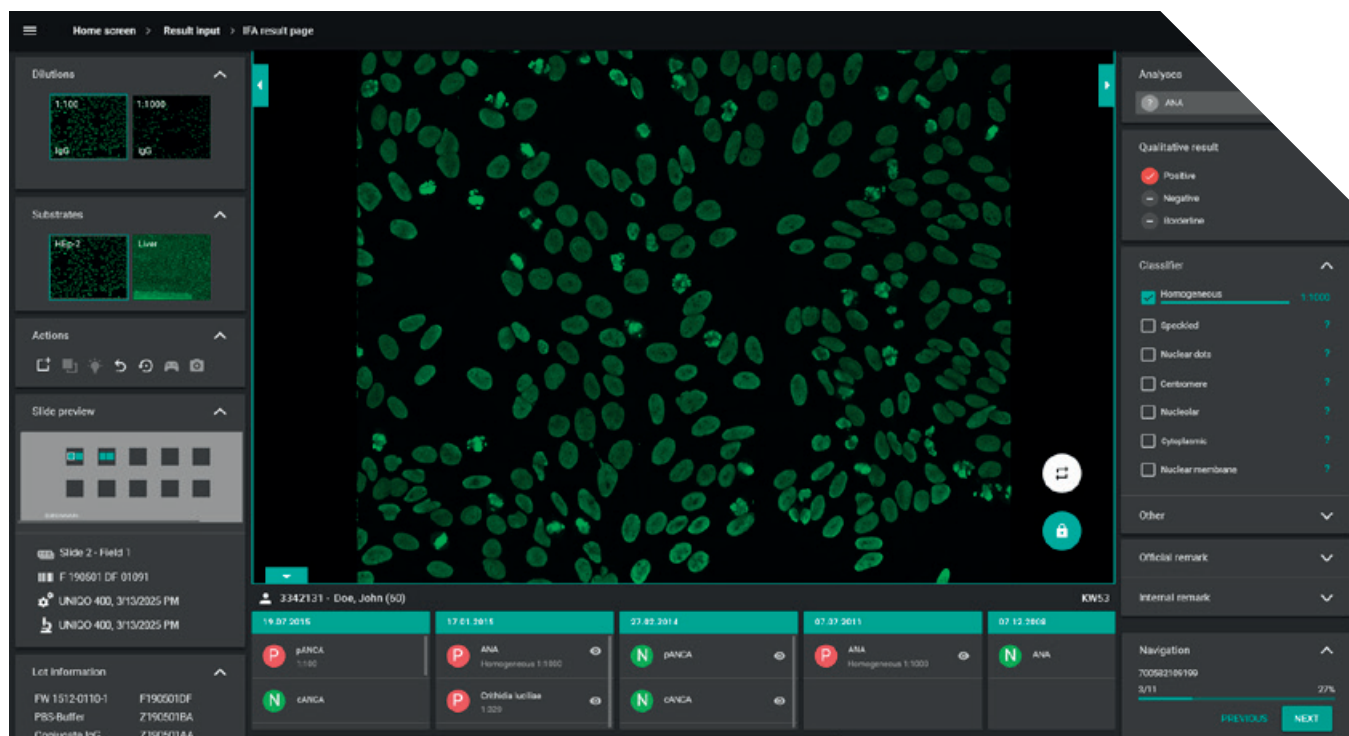
How is IFA evaluation enhanced with AI?

To support laboratories with the demanding task of IFA evaluation, we developed the EUROPattern Classifier, an advanced software that was trained during development using deep convolutional neural networks, a form of artificial intelligence. The software reliably differentiates positive and negative reactions, recognizes specific fluorescence patterns and determines antibody titres. Results can be reviewed and verified by laboratory physicians with a single click, which significantly reduces evaluation time.

The Classifier currently supports interpretation of immunofluorescence patterns on HEp-2 cells, granulocytes, *Crithidia luciliae*, antigen-expressing cells, and complex tissue substrates including liver, kidney, stomach, and esophagus. Available assays depend on



UNI-QO 400



EUROPattern Classifier

instrument configuration and country-specific regulatory approvals. Our software engineers continuously develop, validate and verify the software to further expand its scope of use and support IFA laboratories worldwide.

What are your latest advances?

We have developed two major additions to our IFA portfolio: the UNIQO 400 and the EUROPattern Microscope 2.0. Both systems build on our proven technologies while delivering new levels of standardization and efficiency.

What does the UNIQO 400 offer laboratories?

The UNIQO 400 is an all-in-one solution that provides true walkaway automation of IFA. Our goal in developing this instrument was to reduce manual workload and to free up valuable time for laboratory personnel – all at a much higher capacity than our other offerings. While our existing UNIQO 160 can process 160 samples and 18 slides per session, the UNIQO 400 is designed for high throughputs of up to 396 samples and 40 slides per session. It is thus well suited for laboratories experiencing increasing testing demands.

The UNIQO 400 incorporates many of our established technologies, including BIOCHIP slides, TITERPLANE and MERGITE techniques, automatic slide mounting and high-speed microscopy. One of its most significant innovations is the ability to perform incubation and microscopy functions in parallel, enabling highly efficient IFA workflow management. It also features automatic barcode identification of samples, slides, reagents and dilution blocks, ensuring complete traceability and supporting process integrity throughout the workflow. Its integrated microscope unit captures fluorescence images in just two seconds per image, after which data is transferred to the EUROLabOffice 4.0 software for evaluation using the EUROPattern Classifier.

With the UNIQO 400, we aim to equip laboratories for the future, enabling them to meet the ever-growing demand for high-quality IFA diagnostics with minimal hands-on time and maximum efficiency.

Tell us about the EUROPattern Microscope 2.0

The EUROPattern Microscope 2.0 is our next-generation IFA microscope, bringing together our most advanced microscopy and evaluation technologies in a compact system with a user-focused design.

The microscope combines capacity for up to 50 slides with high-speed image acquisition in two seconds per image. AI-enhanced classification further streamlines result evaluation and supports consistent interpretation.

The system starts up at the touch of a button and has been designed for simple, intuitive operation. As a stand-alone benchtop device, the EUROPattern Microscope 2.0 is the ideal addition for laboratories seeking to upgrade their imaging workflows and increase productivity without introducing a fully automated processing system.

When will these new products be available?

Both flagship instruments are in the final stages of development and will be available soon. We look forward to introducing these innovations to the IFA community and welcome enquiries from laboratories interested in learning more ahead of the launches.

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