

Summary: Navigation system for ocular-less immunofluorescence microscopy, Kristin Rentzsch

The analysis of immuno-histochemical reactions through indirect immunofluorescence for diagnostic purposes in autoimmunity is developing into the direction of an "ocular-free" microscopy: The reactions of incubated preparations are displayed on a computer screen and evaluated interactively. Different navigation systems have been compared, designed for the microscopic screening of varying specimens.

The systems should be able to position the immunofluorescence preparations on a microscope cross table and to focus as well as to support the input of the results in a laboratory management system. The study was commissioned by the company EUROIMMUN AG, which develops, produces and sells medical laboratory diagnostics.

First, the technical and functional requirements of the navigation system as assessed by the management, the departments of diagnostics, computer science and quality management and the potential users were analyzed and defined. A market overview of existing automation solutions for immunofluorescence analysis was created and criteria for the evaluation of the navigation systems were set.

Subsequently, the various working methods were described, namely the indirect immunofluorescence assay, which represents the principle of sample analysis, the conventional fluorescence microscopy as well as five different options of ocular-free screen navigation: the positioning and focusing of the preparations using a 3-D mouse-drive, a 2-D mouse-drive, a special microscope control of the company Märzhäuser and operation of a fluorescence microscope through a touchpad and a touchscreen.

The systems were introduced to five experts from the Clinical Immunological Reference Laboratory of EUROIMMUN AG who were then asked for their opinion. As a result of comparative investigation and expert survey it was deduced that the introduction of screen microscopy increases the value of the immunofluorescence evaluation system EUROPattern®, that the microscope control made by the company Märzhäuser is particularly suitable and that the development of a control system based on a touchscreen has the greatest potential for the future.

To introduce the screen microscopy into the Clinical Immunological Reference Laboratory of EUROIMMUN AG, a validation of the microscope control (Märzhäuser) was made in compliance with an existing quality management system and the accreditation standard DIN EN ISO 15189. Furthermore, a draft of a graphical user interface with a touchscreen was developed. The possibilities for further optimization of screen-fluorescence microscopy as well as the future of microscopic techniques in laboratory diagnostics were discussed.

The EUROIMMUN AG initially favors the system based on the microscope control of Märzhäuser, but is also going to develop a navigation system with a touchscreen and to include it into the laboratory software EUROPattern®. The Clinical Immunological Reference Laboratory of EUROIMMUN AG will initially use the navigation systems which have been selected on the basis of the present study data in parallel to the currently applied immunofluorescence microscopy. After a test period, they will be launched and replace the conventional fluorescence microscopy in the darkroom.