AI Based In Vitro MN Detection

Automated Analysis of the Cytokinesis Block Micronucleus Assay (CBMN)
The analysis and quantification of micronuclei in vitro is a widely performed test for a fast detection of DNA damage in cells exposed to ionizing radiation or genotoxic chemical agents.

Giemsa is often used as a fast and cheap staining for this kind of preparations, however, manual and automated detection and analysis of Giemsa-stained micronucleated (MN) cells can be tedious and difficult due to the low “cleanliness” of the slides and to variations of the staining quality that lead to potential errors during the analysis, and make standardization of the results difficult.

MetaSystems has developed a new Deep Neural Network (DNN) algorithm, trained with thousands of pre-classified data, which brings the advantages of Artificial Intelligence to the detection of MN cells on Giemsa-stained slides.
The DNN classifier is able to detect and sort the cells into 4 different classes based on the number of nuclei and presence or absence of micronuclei. An additional class is reserved for artifacts.

The classes available for the classification are:

- Mononucleated cells with MN
- Mononucleated cells w/o MN
- Binucleated cells with MN
- Binucleated cells w/o MN
- Artifacts

5 DIFFERENT CLASSES IDENTIFIABLE
**RESULTS**

Metafer automatically shows the relative percentages of mononucleated and binucleated cells with micronuclei as a fast parameter to determine the amount of DNA damage.

**GALLERY**

Cells sorted into the different classes are shown in the gallery, with the possibility to switch easily between one class and another in one click.

**RAPIDSCORE**

Users can easily score the gallery and classify the cells based on their number of micronuclei (1, 2 or more than 2 MNs). Results are shown separately for both mononucleated and binucleated cells.
When it comes to Genetic Toxicology, the cytokinesis block micronucleus assay (CBMN) is widely used to quantify the DNA damage potential of chemical substances. Metafer is also able to calculate the Cytokinesis-Block Proliferation Index (CBPI), providing a solution that is compliant with the OECD 487 guideline (Organization for Economic Co-operation and Development).
MAGAZINES
Slide frame magazines hold 16 frames with 5 slides each (80 slides in total). A fully equipped SlideFeeder x80® hosts 10 magazines plus one bar code reader. Each magazine is portable and can easily be taken to the workbench for loading.

FEEDER MODULE
The rotating module of the SlideFeeder x80® delivers the slide frames to the motorized stage. The device runs unattended and is prepared for 24/7 operation - including intelligent priority sample handling.
MICROSCOPE
The high precision research grade fully motorized microscope equipped with a stepping motor stage enables found objects to be precisely recorded and relocated.

Objective: 10x
Light: Transmitted Light

CAMERAS
The Cool Cube cameras are designed with excellent imaging and automation in mind. These provide seamless automated integration with Metafer enabling optimal performance.

SOFTWARE
The PC based Metafer software controls the scanning hardware and provides a convenient user interface prepared for all-day, routine use. Thanks to the exceptional classifier concept each Metafer provides the optimal balance between flexibility and standardization.
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Notes
For Research Use Only (RUO).
Metafer for the in vitro Micronucleus Test is not intended for diagnostic use.

1 Cool Cube 4 is a product from ABS GmbH, Germany
2 SlideFeeder x80 is a product from IML, Germany