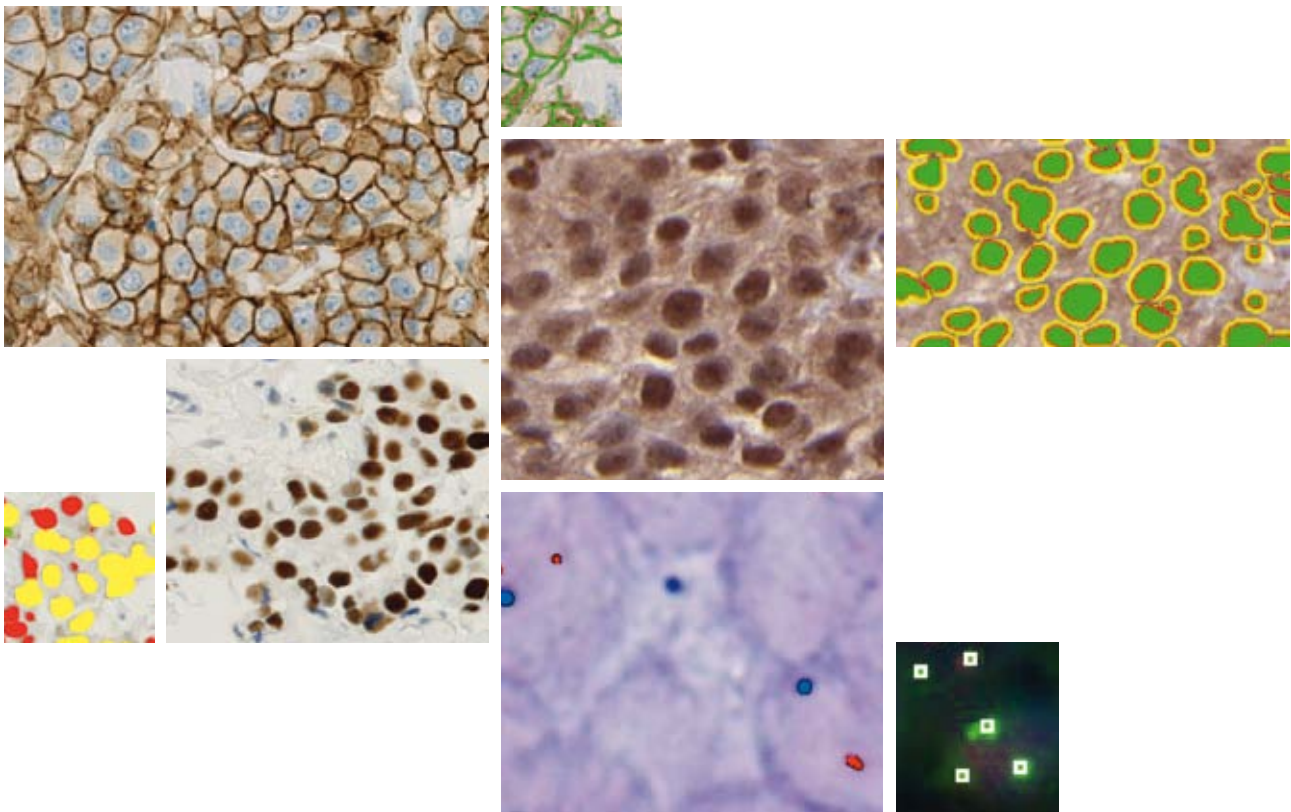


A Research Tool for Sub-cellular Biomarkers

– *TissuemorphDP™ by Visiopharm*



TISSUEMORPHDP™ IS A HIGHLY SPECIALIZED AND DEDICATED TOOL FOR CHARACTERIZATION AND QUANTIFICATION OF NUCLEAR, MEMBRANE, CYTOPLASMIC MARKERS, AND PROBE SIGNALS (XIHS).

Workflows for whole slide image analysis

DESIGNED FOR PATHOLOGISTS

TissuemorphDP™ is a research tool for extraction of sub-cellular morphometric data from whole slide images. It is designed specifically for pathologists, providing simple controls for identification, classification, and quantification of nuclei, membrane, and cytoplasm. It allows pathologists to work in true stain space (through color de-convolution). The technology is based on cutting edge research in image analysis and pattern recognition.

LOW COST OF LEARNING AND COMPUTATION

Even though the technology is advanced, the software is straightforward to use. The application oriented interface makes it easy to select structures of interest including nuclei, membrane, and cytoplasm. A simple slide-bar interface allows the user to control detection sensitivity, classification (positive/negative), size of nuclei, and extent of cytoplasm. The attention given to computational efficiency makes it feasible to run even very advanced analyses on a laptop computer.

IMMEDIATE PRODUCTIVITY

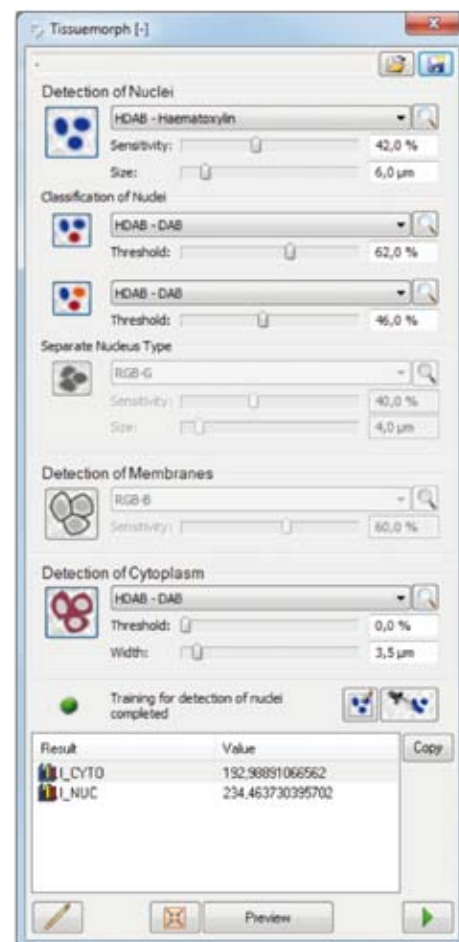
TissuemorphDP™ comes with a library of standard protocols for identification and quantification of nuclear, membrane, and cytoplasmic markers. This makes it easy to become productive quickly and further reduces the learning curve. Library protocols are easy to modify and tune for specific applications. Modified protocols can be saved, loaded, and executed whenever needed.

DATA MANAGEMENT IN THE WORKFLOW

Data integrity and full traceability is provided through an integrated database for management of essential study data. The database manages slide images, image analysis results, regions of interest (ROI) and overlays outlining identified structures in the slides. TissuemorphDP™ is integrated with leading slide servers on the market and provides several tools for import of slide data from other sources. Data are stored in a hierarchical structure that makes it simple to handle any number of related slides as a study or an experiment.

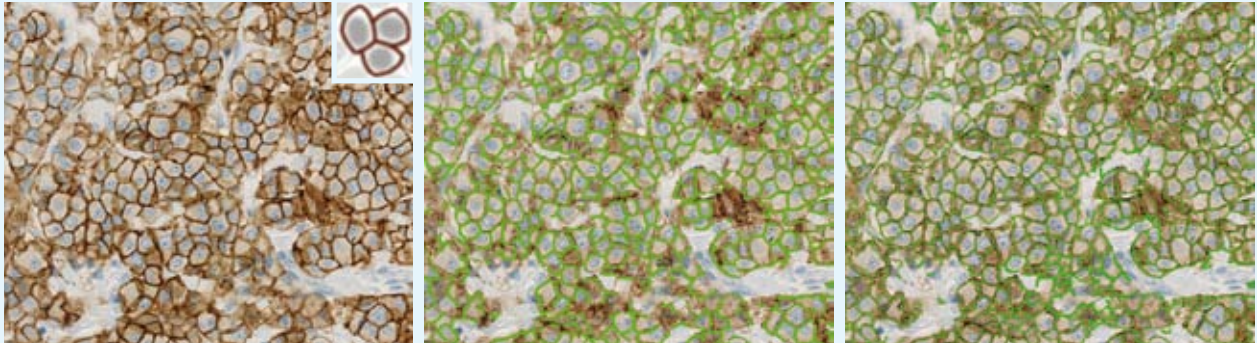
AUTOMATED ANALYSIS AND EFFICIENT REVIEWING

The database allows users to select studies for automated and unattended batch analysis, with any analysis protocol. One protocol may be for automated identification of regions, another for quantification within those regions. Computed results are automatically stored in the database, and reviewed through a dedicated review tool providing immediate access to related slides, results, and overlays with one click of a mouse. When reviewing is completed, data can be exported to an external spreadsheet for further analysis.

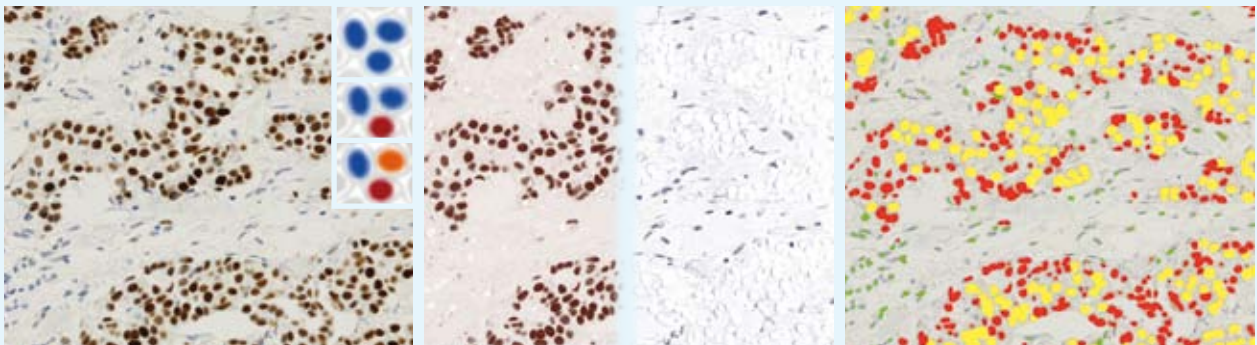


TissuemorphDP™ interface/GUI: The TissuemorphDP™ interface allows the users to control detection through simple manual adjustment of sensitivity and size. The detection of specific compartments (nucleus, cytoplasm, and membrane) can be turned on/off depending on need.

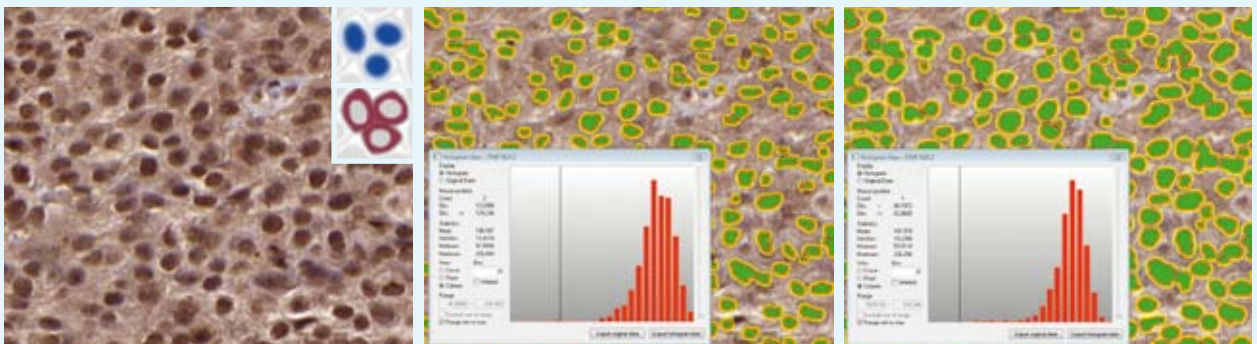
TissuemorphDP™ application examples



Example: Sensitivity of membrane detection can be adjusted by the user with the slide bar and the settings can be saved as a user protocol. A low value was used for the middle image while a high sensitivity value was used for the right image.



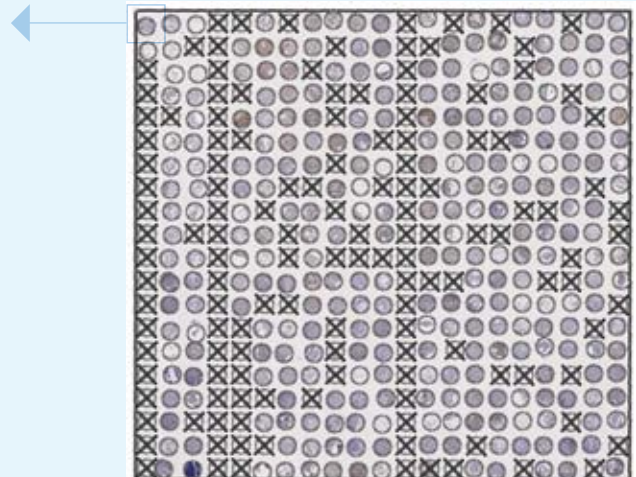
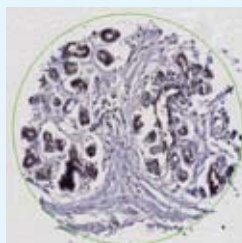
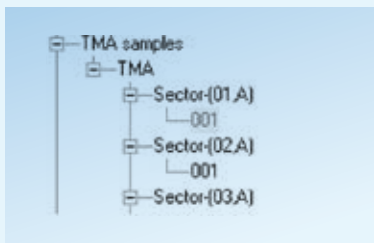
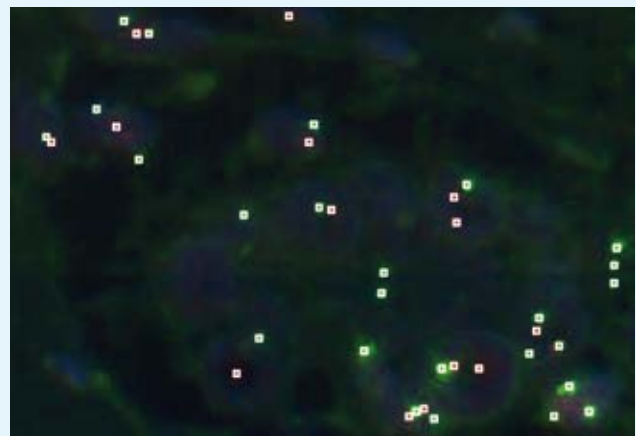
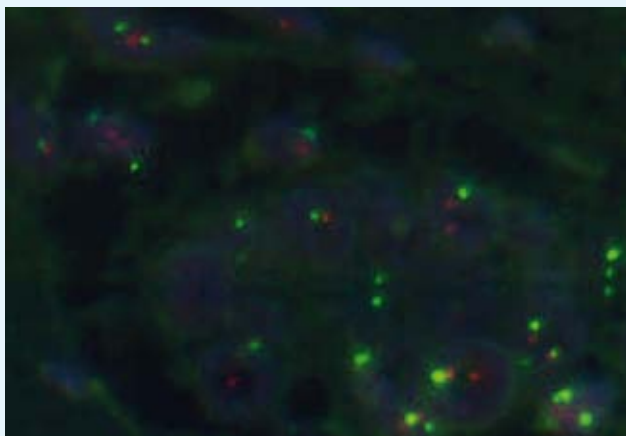
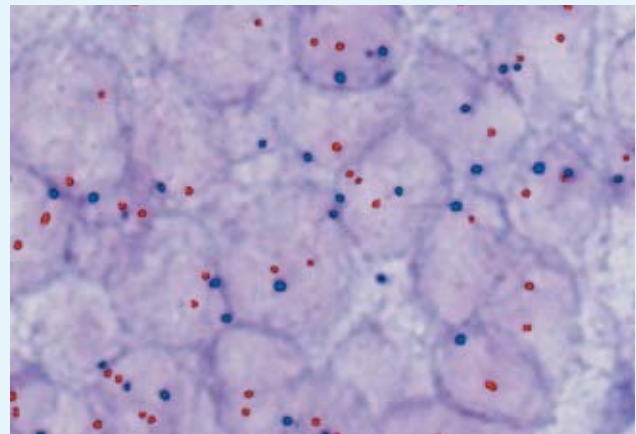
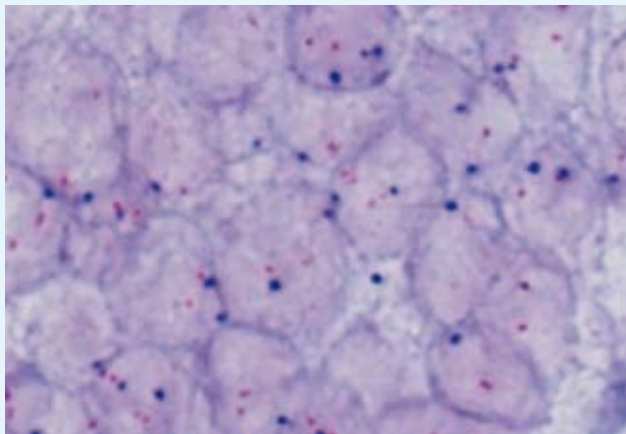
Example: TissuemorphDP™ allows for differentiation of the nuclei based on positivity. The central image illustrates color de-convolution (stain space) for DAB (left half part) and Hematoxylin (right half part), while the image to the right illustrates the separation of nuclei into weak (red) and strong (yellow) positive, and negative (green) nuclei.



Example: The intensities of IHC-staining for nuclear and cytoplasmic biomarkers can be characterized/quantified and readily displayed graphically in a histogram. The image in the middle and to the right represents a low and high sensitivity setting, respectively.

Additional examples

Example: TissuemorphDP™ automatically identifies, highlights, and counts the acceptable signals for in situ hybridization (ISH). Detection of gene copy signals relies on chromogens (CISH), fluophores (FISH), or silver particles (SISH), but in all cases the manual counting of gene copy signals at the microscope is laborious and difficult to authenticate. TissuemorphDP™ reduces workload and improve data quality and documentation of CISH, FISH, and SISH.



TMA compatibility: The ArrayImager add-in module facilitates the analysis of TMAs and other array configurations while maintaining complete traceability of the data.

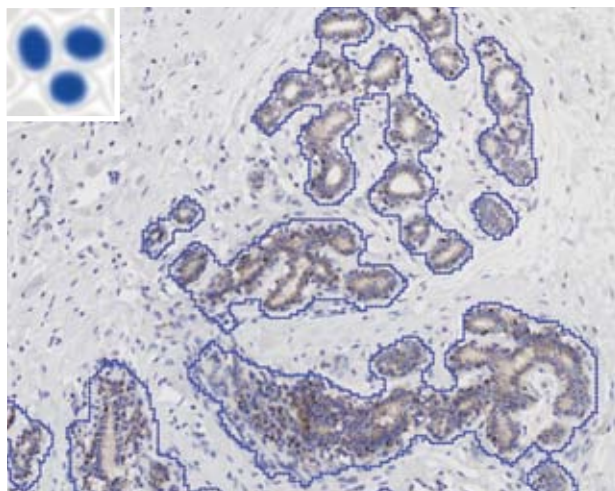
Meeting the needs for automation and flexibility

AUTOMATED REPORTING SAVES TIME – AND HUMAN ERRORS

Reporting study data can be both a time consuming and error-prone step in the work-flow. Especially when analysis results are compiled across several study units (patients or animals), with several slides per study unit, and multiple regions and/or tissue sections per slide. With the built-in reporting module, standard reports can be defined for each type of study, with all relevant sample statistics and plots. Whenever the analysis step has been completed, the report is automatically generated with the sample statistics and plots of relevance to the study.

SIMPLICITY OF USE OR FLEXIBILITY FOR RESEARCH

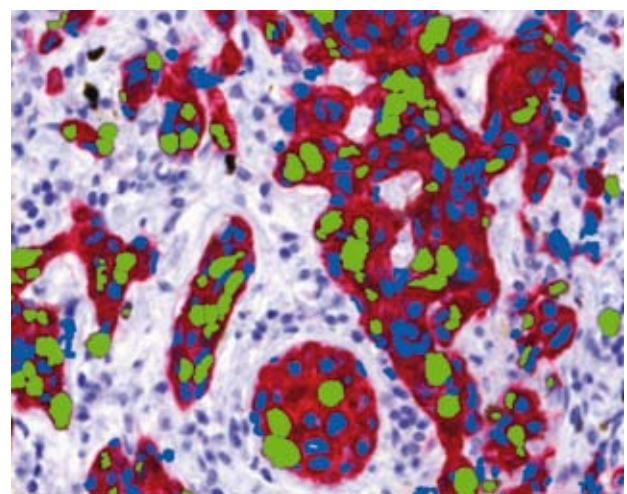
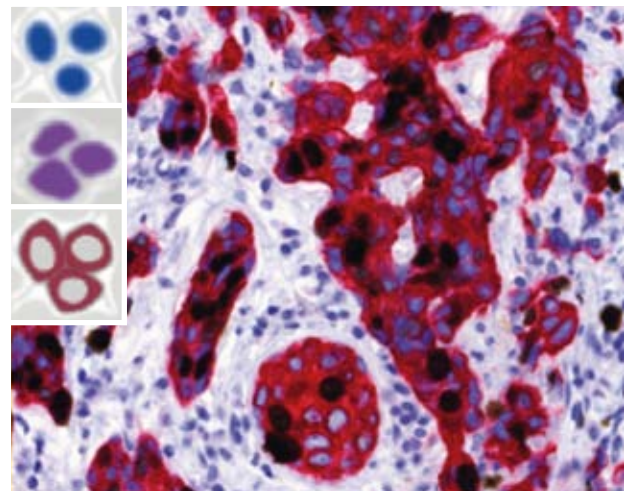
Users of advanced image analysis software often experience the dilemma between simplicity of use and flexibility for diverse and complex research applications. TissuemorphDP™ is resolving this dilemma with its combination of library protocols and a broad range of tools for handling more complex problems. With these tools biological application knowledge can be translated into analysis protocols that can readily be understood, interpreted, and modified by other pathologists. Virtually every research end-point can be defined, describing ensemble values for an entire tissue section, or provide 1-D/2-D histograms to describe distributions of cells.



Automated detection of ROIs: The built-in texture classifier can be trained to detect regions of interest at a low magnification based on textural patterns.

AN OPEN PLATFORM

TissuemorphDP™ and all other software packages from Visiopharm, can be used with all major slide scanner formats and slide databases. This facilitates cross-platform collaboration and gives the freedom to adopt the scanner platform of choice. To further facilitate internal and external collaboration, even across platforms, users will get free access to the Visiopharm View/Review software for (re)viewing images and results.



Doublestaining: A breast cancer biopsy stained for the nuclear proliferation marker, Ki67, and the cytoplasmic tumor markers, pan-cytokeratin. The use of double staining protocols enables automated detection of tumor areas in TissuemorphDP™.

TRAINING AND SUPPORT

Besides on-site installation and training, Visiopharm offers on-line support, allowing our experts to assist in developing Standard Operating Procedures, analysis protocols, and guide users every step of the way.

HARDWARE COMPATIBILITY

Visiopharm provides systems fully configured with all hardware components, but retrofitting is also an option. TissuemorphDP™ is fully compatible with all the leading hardware brands

Microscopes:	<i>Leica, Nikon, Olympus and Zeiss.</i>
Confocal microscopes:	<i>Leica, Olympus and Zeiss.</i>
Whole Slide file formats:	<i>3DHISTECH, Aperio, Hamamatsu, Leica and Olympus.</i>
Stages:	<i>Ludl, Märzhäuser and Prior.</i>
Slide loaders:	<i>Ludl.</i>
Camera:	<i>Basler, Hamamatsu, Leica, Olympus and QImaging.</i>
PC:	<i>All Major brands with Microsoft Windows XP™, Vista™ and 7™.</i>

TissuemorphDP™ comes with a standard protocol library, which may be expanded and individually customized to any given project.

MORE INFORMATION

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