Are you performing studies using tissue sections or TMAs? If so then consider using the new Vectra™ 2, the most advanced instrument for extracting proteomic and morphometric information from intact tissue sections. **Vectra 2 is now compatible with AQUA from HistoRx®, providing validated, quantitative tissue scoring with a reliable, automated workflow.**

Vectra 2 merges automated slide-handling, multispectral imaging technology, and unique pattern-recognition-based image analysis into a powerful system for clinical studies. This system accurately measures protein expressions and morphometric characteristics in distinct tissue regions of interest or on whole slides. Sections can be labeled with either immunofluorescent (IF) or immunohistochemical (IHC) stains, or with conventional stains such as H&E and trichrome. With IF or IHC, single or multiple proteins can be measured on a per-tissue, per-cell, and per-cell-compartment (eg. nuclear, cytoplasmic) basis, even if those signals are spectrally similar, are in the same cell compartment or are obscured by autofluorescence. When used with AQUA, Vectra 2’s multispectral imaging technology provides superior image data to AQUA’s algorithms, increasing sensitivity.
Discover New Phenotypes Associated with Drug Response or Clinical Outcomes

It's now possible to analyze multiple markers per section and extract per-cell multiparameter data in FFPE sections, enabling new combinations of markers to be discovered and validated. Use these new label combinations to test efficacy and safety in clinical studies and correlate multiple molecular states to clinical outcome.

Automate to Best Suit your Study Requirements

Vectra 2 can be programmed to suit your study requirements. Choose from a flexible array of scanning options, including pattern-recognition guided field selection and/or whole slide analysis. Process up to 200 slides in a single run or analyze every spot in a TMA. The system is well-suited to conventional dyes such as H&E or Mason’s Trichrome, or IHC stains such as DAB or Vector Red, and IF labels such as Alexa Fluor® dyes or QDots®, and now features pre-prepared workflows and filters for slides labeled with HistoRx AQUA stain kits.

Obtain Per-cell and Per-cell-compartment Multiparameter Data

In multiplexed assays, reliably and accurately separate label signals from one another and from autofluorescence. Extract per-cell multiparameter data from one or more cell compartments to generate tissue-based cytometric analysis similar to that generated with flow cytometry. “Tissue cytometry” uniquely reveals cellular expressions while retaining tissue architectural context.

Easily Train the System to Capture Regions-of-interest

Vectra 2 is powered by Caliper’s inForm™ software, which includes tissue segmentation algorithms. The software can be trained through a simple learn-by-example interface, teaching the system to locate tissue regions automatically. Often only a handful of representative images are required for training. Automated acquisition from multiple slides in a batch run involves 4x whole slide scans followed by high-magnification 20x imaging of only regions-of-interest (see inside flap for workflow). This approach greatly reduces acquisition and analysis time and makes the most efficient use of hard disk storage space.
Example Applications that Benefit from Vectra 2’s Unique Multiparameter Analysis and Turn-key Repeatability

- Transduction signaling pathway activity: General signaling (e.g., pAKT, pERK, and pS6) or particular pathways (e.g., p13K/mTIR, MAPK, or EGFR)
- Automated imaging & scoring of tissue sections or TMAs with AQUA by HistoRx: research or other work at LDT/CLIA facilities
- Tissue structure quantitation: such as necrosis and fibrosis using conventional stains
- Per-cell and per-cell-compartment phenotyping
- Apoptosis and/or proliferation assays
- Cell cycle characterization
- DNA damage determination
- Inflammation
- Lymph node metastasis

AQUA-Enabled for the Best of Both Worlds

Vectra 2’s multispectral technology produces uniquely pure images of each fluorescent label, uncontaminated by cross-talk or by autofluorescence. Caliper’s new workflow tool, AQUAduct, and HistoRx’s batch-processing tool, AQUAserve, together create a seamless, automated imaging & analysis tool, letting you load slides into the Vectra 2 in the evening and then return the next morning to read the automatically generated tissue-score reports.

The Vectra 2 Survey-and-Drill Workflow  getting to the answer faster

**Acquire 4x Survey**
- Vectra 2 quickly scans sample at 4x magnification.

**Select 20x Fields**
- User trains Vectra 2 by hand-drawing regions-of-interest on a select number of training images. Vectra then segments the tissue using pattern-recognition algorithms.

**Acquire 20x Fields**
- Vectra 2 acquires 20x fields (multispectral, RGB or monochrome) for analysis based on tissue segmentations.

**Segment**
- inForm software, which comes with Vectra 2, segments 20x fields and extracts multiparameter data.

**Export**
- User exports extracted data using industry-standard formats.

"Vectra has allowed us to break the boundary of routine immunohistochemical and immunofluorescence studies...this has greatly expanded our ability to use pathology slides to ask and answer questions about human disease."

Dr. Michael Feldman, University of Pennsylvania
**A Complete Product Portfolio**

### inForm

inForm image analysis software for automated quantitation of markers in cells and tissues. inForm addresses key data extraction challenges by using machine learning, that enables the expert to teach the software to identify and segment tissue areas or objects automatically.

### Nuance

Nuance multispectral imaging systems for quantitative, multiple-marker analysis in immunohistochemistry and immunofluorescence microscopy. As biological imaging becomes more about studying complex systems revealed through the presence of more than one label, Nuance multispectral imaging systems enable higher degrees of multiplexing and reliability, producing clear and accurate images of each label, even though they are from a multi-labeled tissue section.

### Vectra 2

Vectra 2 slide analysis system for automated high-throughput slide imaging and analysis, the world’s only multispectral fluorescence- and brightfield-capable system. Pattern-recognition based scanning automatically acquires high-resolution multispectral images of microscope slides. Samples can be cultured cells, cell spreads, tissue sections or tissue microarrays, stained with standard stains such as H&E or trichrome or immunofluorescence and IHC techniques. Now AQUA-enabled for simplified workflow with validated tissue-scoring algorithms.

### VECTRA SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Tissue formats</strong></td>
<td>Tissue microarrays (TMAs) and tissue sections</td>
</tr>
<tr>
<td><strong>Spectral Range</strong></td>
<td>420 – 720 nm (tunable)</td>
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<tr>
<td><strong>Throughput for Tissue Sections</strong></td>
<td>Whole slide at 4x: 90 sec per 1.5x1.5 cm area, Survey-and-drill: 4 to 10 min per slide</td>
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<tr>
<td><strong>Throughput for TMAs</strong></td>
<td>5 cores per min</td>
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<tr>
<td><strong>Modality</strong></td>
<td>Brightfield and Fluorescence (multispectral or color)</td>
</tr>
<tr>
<td><strong>Automation</strong></td>
<td>Fully automated walk-away acquisition and analysis up to 200 slides</td>
</tr>
<tr>
<td><strong>Multiplexing Capability</strong></td>
<td>Separates up to 8 markers (including autofluorescence) even if overlapping</td>
</tr>
<tr>
<td><strong>Image Analysis Software (inForm)</strong></td>
<td>Intuitive learn-by-example interface to automatically segment and quantitate tissue structures, cells and sub-cellular signatures</td>
</tr>
<tr>
<td><strong>Magnification</strong></td>
<td>4x &amp; 20x</td>
</tr>
<tr>
<td><strong>File Format</strong></td>
<td>.im3 for multispectral data (Caliper format)</td>
</tr>
<tr>
<td><strong>Operating System</strong></td>
<td>Windows™ 7 64-bit</td>
</tr>
<tr>
<td><strong>Computer</strong></td>
<td>Dual Quad-Core processors with 1 Terabyte for data storage</td>
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</tbody>
</table>

Product specifications subject to change. Refer to the Caliper website for current information.

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**Photography Credits**
- Assortment of Vectra images of multi-label IHC sections and lung tissue microarrays labeled with Alexa 555 marking pERK and Alexa 647 marking pS6.
- Autofluorescence was unmixed and subsequently removed from representative fluorescence images. Red and green images include segmented regions of interest; in this case, tumor regions (red) versus stroma (green). Batch processing of images after training resulted in segmented target regions that were further segmented at the cellular and sub-cellular levels. Extracted data was analyzed on a per-cell basis.