HUMAN HEALTH

ENVIRONMENTAL HEALTH

# 3D IMAGE ANALYSIS UNDERSTAND CELLS COMPLETELY AND IN CONTEXT

VOLOCITY SOFTWARE

3D Image Analysis Software

PerkinElmer®
*For the Better*


EXPLORE AND
VALIDATE YOUR
BIOLOGICAL
FINDINGS




# A UNIVERSAL SOLUTION FOR 3D IMAGE ANALYSIS

To get to that next important insight, you need to go where your biology leads you. The challenge is that biology lives in three dimensions. How can you know the shape of a structure unless you view it from every direction? How can you know its size unless you measure the volume? How can you tell whether two structures are close together or intertwined unless you can see both completely and from every angle? Volocity 3D Image Analysis Software enables you to make discoveries and answer complex questions that are beyond the limitations of 2D.

## Turn observations into understanding

Moving seamlessly among restoration, visualization and quantitation, Volocity software is designed for true 3D analysis of fluorescence images. View your cells from every angle. Measure shapes, volumes and distances. Relate cellular structure to function with exceptional precision and speed. Compare samples and identify trends. Produce publication-ready tables and charts. Take your image analysis to a new dimension with true 3D image analysis.

## A powerful solution for every lab

Designed for ease of use and exceptional performance, Volocity software is compatible with most confocal microscopy, widefield and high content screening systems – one 3D analysis solution and one learning curve for all your fluorescence imaging systems. With flexible licensing options, it can serve individual researchers as well as departments and entire organizations. Because it is also supported by world-class technical support, training and expertise, you can count on Volocity software to accelerate your research through your entire 3D imaging process.

Flexibility, ease of use and powerful performance: That's why there are thousands of users around the globe and thousands of peer-reviewed papers referencing Volocity software – the universal solution for 3D image analysis.

# REVEAL MORE.
# RELATE MORE.
# REALIZE MORE.

Whether you are studying cells, tissues or organisms, Volocity software lets you see relationships you haven't seen before and then validate your observations. Because seeing is not enough anymore, you have to prove it with quantitative results.

## Explore, interact and publish in 3D

**Acquire 3D image stacks from the instrument of your choosing**

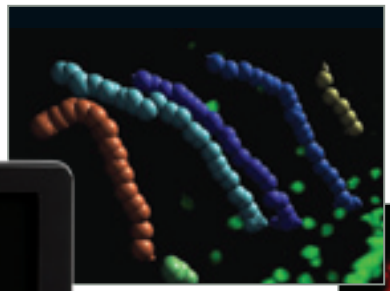
- Ultra*VIEW*® VoX – 3D Live Cell Imaging system powered by Volocity for seamless acquisition to analysis
- Operetta® – High Content Imaging system
- Other fluorescence microscopes and imaging systems – Volocity software supports files from most confocal, widefield and high content imaging systems

### VOLOCITY VISUALIZATION

Get a full picture of biological processes and uncover cellular relationships you can't see with 2D analysis, with rapid, interactive, high-resolution volume rendering of time-resolved, multichannel 3D data sets.

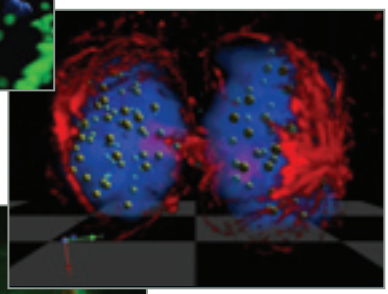
- Import a wide range of file formats
- Drag and drop your image files into the software to interactively explore in 3D
- Rotate, zoom and fly through rendered objects in real time
- Choose from rendering options including solid surfaces, varying opacity and shadows
- See how the three dimensions intersect at any point
- Explore structures and processes from any angle in fixed and dynamic experiments
- Prepare stunning images for publication
- Produce compelling movies for presentation

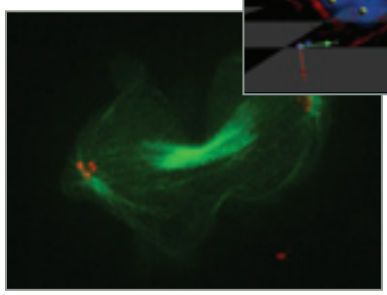
Tracking overlaid with 3D image data using Volocity Quantitation.



Cardiac tube of a Drosophila larva rendered using Volocity Visualization.

Volocity Visualization used to clearly show kinetochores as solid spheres within the nucleus.





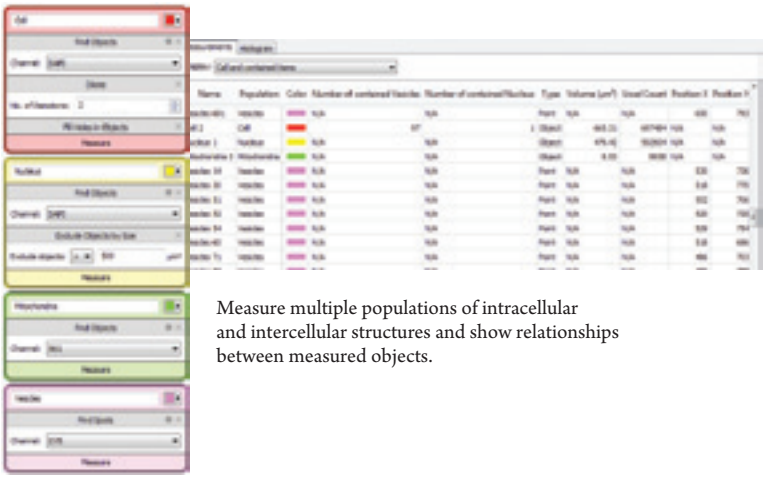
Show dynamic events in 3D over time and create publication-quality movies.

# Measure, analyze and relate your discoveries

## VOLOCITY QUANTITATION

Validate and confirm your observations of cellular structure with accurate 3D measurement and analysis.

- Compare and relate cellular organelles within and between samples for a better understanding of intracellular and intercellular relationships
- Perform morphological analysis
- Measure fluorescence localization and colocalization
- Measure distances within and between organelles
- Automatically track large numbers of cells
- Refine your experiment quickly and easily with immediate feedback
- Overlay measured objects on image data
- Automatically measure or analyze multiple samples with batch processing
- Utilize specific analysis tools for quantifying colocalization, ratioed images, FRAP and FRET
- Create charts and graphs to identify trends, and export for publication or further analysis

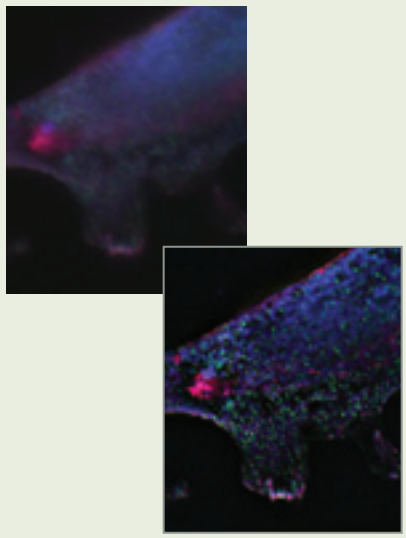


Measure multiple populations of intracellular and intercellular structures and show relationships between measured objects.

## See your cells with stunning clarity

**Volocity Restoration** – Quickly and easily improve the quality and resolution of your widefield and confocal images to gain greater insight. Reveal more detail for visualization and achieve more accurate quantitation with deconvolved data.

- Create calculated PSFs or use a measured PSF from your microscope
- Batch process multiple data sets
- Further improve the quality of image data acquired on the Ultra*VIEW* VoX and Operetta systems

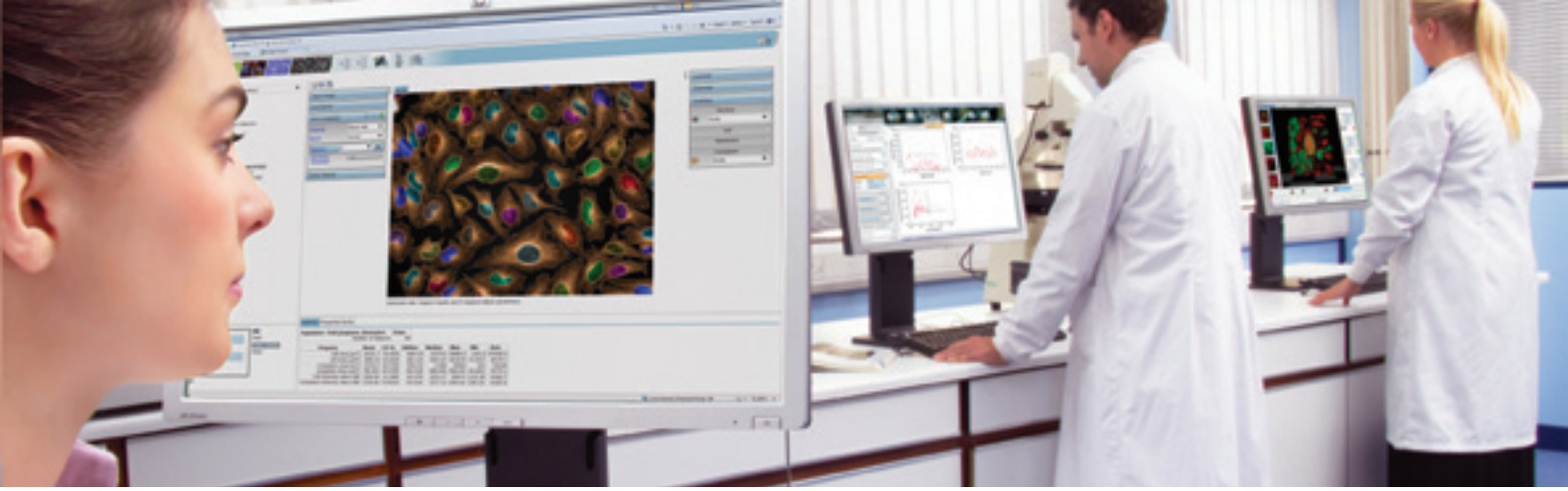


# Gain greater insight into your biological questions – and share it sooner

# A SOLUTION THAT'S FLEXIBLE TO MEET YOUR LAB'S NEEDS

Volocity software's flexibility is unrivaled, allowing you to tailor your 3D image analysis to the specific needs of your lab and your research. It has a range of powerful tools to choose from, flexible licensing to suit every size of lab from individual researchers to entire organizations, and compatibility with a wide range of imaging instruments.

| **Volocity Software – A comprehensive solution with benefits throughout your workflow** | | |
|---|---|---|
| Supports a wide range of file formats | > | Save time with a single learning curve by using one solution for all your lab's confocal and widefield fluorescence microscopes and high content screening systems |
| Batch processing | > | Increase productivity by avoiding repetitive actions and treating multiple data sets in the same way; compare measurements from multiple experiments to validate your results |
| Parallel processing | > | Utilize multiple processors for faster results |
| A 64-bit Windows® solution | > | Support very large data sets |
| Suitable for Mac OS X, 64-bit and 32-bit Windows | > | Choose your preferred operating system |
| Flexible licensing options | > | Combine and share software licenses across networks with the flexible, cross-platform Imaging License Server to provide a cost-effective solution for individual labs and large institutes |
| Distributed computing (optional) | > | Accelerate processing-intensive tasks with the Imaging Computer Server and get your results faster |
| FRAP and Ratio plug-ins (optional) | > | Extend the functionality of Volocity software for online FRAP and ratio acquisition and analysis |
| **QUANTITATION** | | |
| Detection and measurement of objects in 2D and 3D | > | See results immediately so you can refine your protocol quickly and easily |
| Population-based and relative measurements | > | Work in biological units and generate measurements your way – by cell, tissue or whatever you choose |
| Automatic tracking of large numbers of objects in time-resolved 2D and 3D | > | Improve precision to understand samples in greater detail |
| Chart and graph capabilities | > | Display data and identify trends and patterns for a greater understanding sooner |
| Overlaying of objects and tracks with 3D image data | > | Validate and confirm results by gaining a better understanding of how they were derived |
| **VISUALIZATION** | | |
| Rapid, interactive, high-resolution rendering of multichannel 3D volumes | > | Rotate, zoom and fly through samples to explore your data sets in new ways |
| Choice of rendering options | > | Choose how to display your data for better understanding or to prepare for publication |
| Images and movies for publication | > | Share and publish results as images, QuickTime®, AVI and WMV movies, or QuickTime® Virtual Reality movies |
| **RESTORATION** | | |
| Choice of restoration algorithms | > | Create the highest-quality images with ultrafast improvement of resolution in X and Y or iterative restoration in X, Y and Z |
| PSF flexibility across imaging technology | > | Calculate PSFs for confocal, spinning disk, two-photon and widefield imaging modalities, or use a measured PSF |



# EXPERIENCE A WORLD OF EXPERTISE, SUPPORT AND EXCELLENCE

Backed by a global leader, Volocity software extends beyond advanced software to give you a comprehensive solution – one that includes world-class technical support, training and expertise.

## Critical knowledge and services to accelerate your research

- Our technical support desk provides customers with an efficient, fast response to queries and problems
- Our expert imaging team understands your science and provides specialist applications support and training to get you to where you want to be
- A range of online resources, including technical notes, product manuals, tutorials, publication notes, citations library and case studies, are available on our website to support you
- A 12-month software maintenance agreement (SMA) ensures that you have access to the latest versions of Volocity software
- The ability to purchase additional SMAs after the initial 12-month period saves on upgrades

## A complete collection of cellular imaging solutions to choose from

- **Columbus™ Image Data Management and Analysis System** – A universal solution for data management and analysis that allows you to quickly and safely store and share images across a network. Drag and drop images from Volocity software into the Columbus system for storage and access to 2D analysis, so you can measure changes in cell properties. Or drag and drop images from the Columbus system into Volocity software for 3D visualization and analysis.
- **Operetta High Content Imaging System** – An intuitive system designed for biologists who are looking for the verification that high content analysis affords. It's the efficient, effective way to analyze and quantify your samples, and move your research forward.
- **Opera® High Content Screening System** – The ultimate in high throughput, speed and resolution, the Opera system is ideal for flexible, scalable assay development and robust screening.
- **Ultra*VIEW* VoX 3D Live Cell Imaging System** – The only 3D spinning disk solution that takes you from acquisition to analysis for multiple applications. Designed for high speed, maximum sample protection and unprecedented 3D results, the system is also highly configurable to your research needs. And with high-performance Volocity software at its core, you get a fully integrated software solution to turn images into results.

**Try the Volocity software for free. Simply visit www.perkinelmer.com/volocitydemo.**

Download the Volocity demo software and see for yourself how easy it can be to interact with and analyze your images in 3D.

## Results. Smarter. Faster.

With a growing emphasis on translational insight, it is more important than ever to be able to examine the molecular mechanisms of disease and translate your *in vitro* models into *in vivo* results. PerkinElmer offers leading solutions and renowned expertise in assays, imaging and informatics that will help you bring it all together. Whether working in a well, cells or small animals, now you can focus on your science, gain insight sooner and succeed faster.


## Scientific references

To view all publications that reference the use of Volocity software, please visit the PerkinElmer Life Sciences Citations Library, which currently contains over 4,500 publications referencing the use of PerkinElmer products at www.perkinelmercitations.com.

Learn more at www.perkinelmer.com/volocity

*Acknowledgments:*

*Alzheimer's disease plaque surrounded by microglial cells rendered using Volocity software. Data set courtesy of Professor Elizabeth Head, Sanders-Brown Center on Aging, Lexington.*

*Sample showing dividing human cancer cells before (upper half) and after (lower half) deconvolution using Volocity software. Image courtesy of Dr. Mark Petronczki, Cancer Research UK.*

*Quantitative measurements of a polarized mammary epithelial acinus using Volocity software. Data set courtesy of Professor Charles Streuli and Dr. Nasreen Akhtar, University of Manchester.*

*Cardiac tube of a Drosophila larva rendered using Volocity software. Images courtesy of Dr. Nathalie Lalevée and Dr. Sébastien Sénatore, Institut de Biologie du Développement de Marseille-Luminy.*

*Live cell imaging of Drosophila S2 cells in anaphase. Image courtesy of Dr. E. Karsenti, EMBL, Heidelberg.*

*Chicken embryonic fibroblasts before and after deconvolution using Volocity software. Image courtesy of Professor Philip Santangelo, Georgia Institute of Technology and Emory University, Atlanta.*

*HeLa cell in telophase visualized using Volocity software. Image courtesy of Dr. Muriel Erent, McAinsh Lab, Centre for Mechanochemical Cell Biology, Warwick Medical School, The University of Warwick.*

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