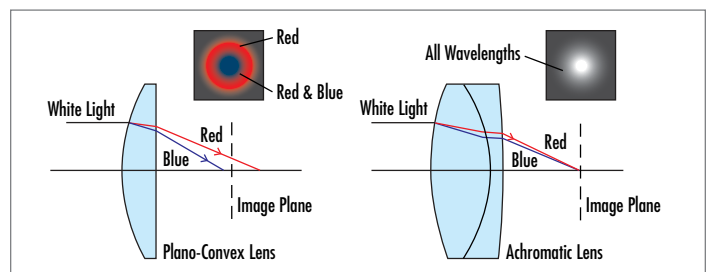


# IN VIVO IMAGING USING FLUORESCENT MICROSCOPY

UVP is a leading manufacturer and developer of fluorescence and luminescence-based bio imaging systems for Genomic, Proteomic and *In Vivo* applications for pre-clinical markets. The latest addition to UVP's iBox series of in vivo small animal imaging systems, iBox® Explorer™ Imaging Microscope, combines AntiCancer's proprietary fluorescent-protein-based small-animal imaging technology with a UVP innovative world class imaging system. UVP and EDMUND OPTICS® collaborated on developing system level specifications to meet the desired system improvements to enable researchers to visualize and capture multispectral fluorescently labeled cells. The required selected optical components were supplied by EDMUND OPTICS®.

*In Vivo* fluorescence imaging of small animals has important implications for drug discovery, development in validating drug targets, and in studying the bio distribution, target binding, clinical effects, and toxicity of drug candidates. *In Vivo* studies include cancer research, heart disease, gene therapy and tumor detection using fluorescent tagged cells. Real time, non-invasive imaging capabilities speed up basic and preclinical research studies in oncology, cardiovascular and metabolic diseases. The main customers include pre-clinical biomedical research molecular diagnostics imaging labs, cancer research centers, diagnostic pathology labs, and oncology drug development research centers.

*In Vivo* imaging enables researchers to view biological processes at the molecular level. UVP's new iBox® Explorer™ Fluorescence Imaging Microscope for *In Vivo* analysis is capable of visualizing whole organs as well as individual cells, making it well suited for the study of metastatic cancer and its high resolution and low light sensitivity allows detection of fluorescent markers deep within the animal. The demanding application performance requirements are achieved by engaging an intense broadband illumination using a powerful light source (UV to NIR), high sensitivity CCD camera with fast exposure times and an optimized filter set. The use of large-diameter optics with a large aperture for optimal light gathering assures long working distance and wide field-of-view from whole animal to cell-based resolution.



# PRODUCT DEVELOPMENT CHALLENGE

- UVP product development team aimed to improve the iBOX® microscope performance while keeping the cost low and opted for using standard catalog optics.
- EO solutions engineer reviewed existing part list and related Zemax models and provided design assistance to UVP's existing design constraints and quantified desired iBOX® system improvements. He created Zemax models based on EO components and submitted for UVP's review.
- EO engineer built and tweaked several prototypes using assortment of achromatic lenses and singlets to form multi-element objectives and tube lenses that can be mixed-and-matched to provide 7 different magnifications and provided performance test images to UVP. Re-design and testing was done to further improve resolution, achieve better contrast, expand field of view and increase range of magnification.
- EO sent a working prototype to UVP and provided follow-up support and instructions on how to calculate primary and system magnification.

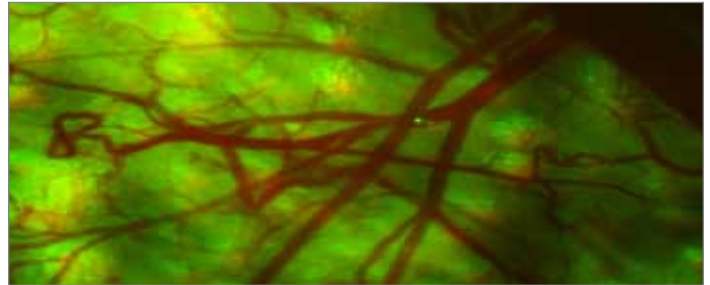


Image courtesy of UVP

#### iBox® Explorer™ tumor cell imaging

Cellular trafficking of cancer cells within the vasculature of a mouse, which was imaged using UVP's iBox® Explorer™ *In Vivo* imager. The imager uses off-the-shelf achromatic lenses and other single lenses and filters to form multi-element objectives and tube lenses that can be mixed and matched to provide seven different magnifications. Filter combinations were optimized to ensure good signal-to-noise ratio for each color channel. GFP tagged nucleus of the Human HT-1080 fibrosarcoma cell can be seen migrating downstream from the injection site, passing the bifurcation of a distal vein (down and to the right of center).



## EO PARTNER UVP

**Market:** Life Sciences

**Application:** *In Vivo* Imaging

UVP is a global leader in life science imaging, supplying imaging systems for academic, biopharmaceutical and biotechnology applications. The organization provides comprehensive service and support to customers and dealers worldwide. UVP's headquarters and manufacturing operations are located in Upland, California. European Operations, Ultra-Violet Products Ltd., is headquartered in Cambridge, England.

**UVP Core Expertise:**

- Fluorescence, chemiluminescence and colorimetric based imaging applications for the life sciences
- Leading developer and manufacturer of ultraviolet products since 1932