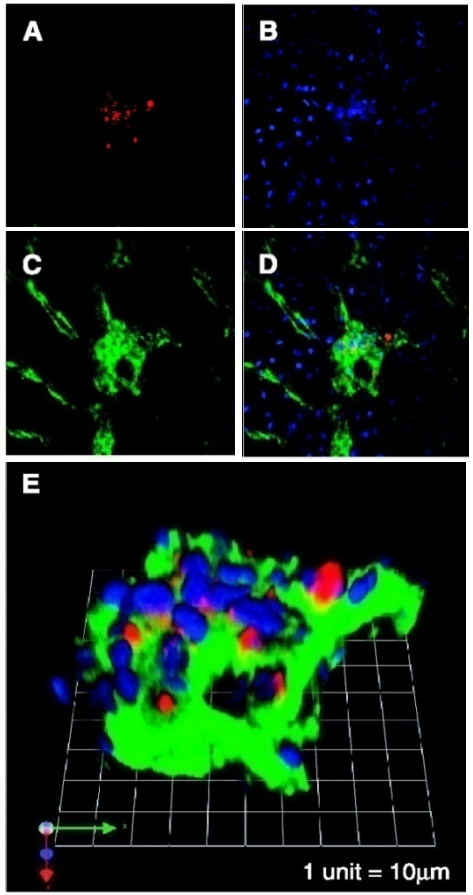
Application Note
Dr. Estrada and colleagues
Children's Hospital Boston & Harvard Medical School, Boston, Massachusetts

PerkinElmer
For the Better

Measurement of tumor volume using Volocity



In many types of cancer, tumors which are histologically indistinguishable from each other may differ significantly in their aggressiveness and response to therapy. It is therefore a challenge for clinical management to identify patients whose disease is likely to progress.

In this study, researchers have developed a novel, orthotopic strategy for the behavioral profiling of human cancer *ex vivo*, using Quantum dot (Qdot)–based fluorescent imaging approaches. The system, which they have called EViTAS (*ex vivo* tumor assay system), was used to obtain quantitative measurements of tumor cell behavior in order to classify tumors and predict their responses to treatments. The transitional cell carcinoma (TCC; bladder cancer) was used as a test system.

Qdot-labeled TCC cells were instilled into a rat bladder which was maintained in organ culture *ex vivo*. The implantation, proliferation and invasion of tumor cells into the bladder wall were then monitored and quantified. Fluorescence images and z-stacks were captured and were imported into Volocity. Using Volocity Visualization, 3D renderings of the tumor cell mass were generated as shown in the figure. To reliably estimate tumor volume, Volocity Quantitation was then used to calculate the volume of the tumor focus as 59,652 μm^3.

Using this approach, researchers were able to assign distinct phenotypes to well characterized TCC cell lines, based on their different patterns of invasiveness into the bladder wall. This is a sensitive and convenient tool for the quantitative assessment of bladder cancer cell behavior and could potentially be used to obtain clinically relevant information for individual patients.

Figure: TCC cells within the bladder wall. Tumor cells were visualized with Qdots® 655 (red, panel A), nuclei with Hoechst 33342 (blue, panel B) and the tissue architecture was visualized using lectin WGA conjugated to Alexa Fluor® 488 (green, panel C). Panel D shows a merged image. A 3D rendering of the tumor cell mass, generated using Volocity Visualization, is shown in panel E. The volume was measured as 59,652 μm^3 using Volocity Quantitation.

Figure adapted with permission from the American Association for Cancer Research. Estrada CR, Salanga M, Bielenberg DR, Harrell WB, Zurakowski D, Zhu X, Palmer MR, Freeman MR and Adam RM (2006). Behavioral Profiling of Human Transitional Cell Carcinoma *Ex vivo* (Figure 5).
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