Cancer Research: GE Healthcare Cell Analysis portfolio in action

Cancer Researchers around the world unite in their studies to bring about improved patient outcomes with more effective and better tolerated treatments. At GE Healthcare, we are proud that our Cell Analysis portfolio plays a meaningful role generating high quality cellular images to advance cancer research – with over 300 publications in 2015 alone.

The IN Cell Analyzer, a high content cellular analysis system, plays an integral role in publications spanning the drug discovery pipeline. The high resolution imaging system, DeltaVision™ Elite, is used across disciplines, from characterizing molecular pathways in cancer, to investigating mammalian models of cancer, to advancing clinical research. Finally, the super-resolution DeltaVision OMX system is used in a diverse array of research including molecular pathway analysis, investigating mechanisms of therapies, and understanding cancer cell metabolism.

### 2015 Cancer Biology Publications

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**IN Cell Analyzer**

**High Content Cellular Analysis System**

Ultra-sensitive detection of tumorigenic cellular impurities in human cell-processed therapeutic products by digital analysis of soft agar colony formation


**Science:** While cell therapies are highly promising, contaminating cancerous cells represent a significant obstacle to their success. Kusakawa and colleagues have developed a very sensitive assay to detect such contamination. First, they grow mesenchymal stem cells in soft agar and if cancer cells are present, a colony will form. Next, they dissolve the agar, pellet the colony onto a microtiter plate and image. The sensitivity of the assay allows them to identify a single cancerous cell in 10 million therapeutic cells! Within a few years, this technique could become a standard quality control procedure in human cell therapy in Japan.

**Technology:** In a 96 well format using a 4x lens, IN Cell Analyzer 2000 imaged four fields of view per well in three channels. Images were stitched together to view the entire well and analyzed using IN Cell Developer Toolbox to segment the colony based on size and morphology.

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**DeltaVision Elite**

**High Resolution Imaging System**

Tumour-associated macrophages act as a slow-release reservoir of nano-therapeutic Pt(IV) pro-drug


**Science:** While therapeutic nanoparticles (TNP) are promising in cancer therapy, their mechanism of action is not well understood. By imaging macrophages, TNP, and the drug loaded on the TNP (called the payload), Miller and colleagues find that interactions between TNP and tumor-associated macrophages are required for proper delivery of the TNP. Further investigation of this pathway should guide future TNP design, ultimately improving success rates in clinical trials.

**Technology:** Live cells were imaged on a DeltaVision Elite to examine therapeutic nanoparticle uptake. Here, tumor cell DNA-damage is shown in red (53BP1-mApple), TNP vehicle is shown in blue, and the TNP payload is shown in yellow.

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**DeltaVision OMX**

**Advanced Multimode Super-Resolution System**

RNaseH1 regulates TERRA-telomeric DNA hybrids and telomere maintenance in ALT tumour cells


**Science:** The mechanism by which telomeres are recombinogenic in the alternative lengthening of telomeres pathway in cancer cells is poorly understood. This pathway is imperative to understand, as it is associated with aggressive cancers. Arora and colleagues elucidate a key mechanism controlling telomere maintenance in alternative lengthening of telomere (ALT) cells by demonstrating that RNaseH1 controls the levels of RNA-DNA hybrids between telomeric DNA and the long noncoding RNA called TERRA. With this additional information about the ALT pathway, development of a well-tolerated anti-ALT therapy is possible.

**Technology:** Structured illumination imaging and image reconstruction were performed on a DeltaVision OMX V4 Blaze. Here, an ALT-associated PML body is imaged in an experiment combining immunofluorescence with fluorescent in situ hybridization to visualize the RNA component, TERRA, in red, with proteins TRF2, shown in green, and PML, shown in cyan. Scale bar = 0.4 μm. Top row represents SIM images and Surface renditions were generated in Imaris 6 (Bitplane).
Selected publications highlighting IN Cell Analyzer in cancer research


et al.


et al.


Selected publications highlighting DeltaVision Elite in cancer research


et al.


Selected publications highlighting DeltaVision OMX in cancer research


et al.

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1 Title: Ultra-sensitive detection of tumorigenic cellular impurities in human cell-processed therapeutic products by digital analysis of soft agar colony formation
Authors: S. Kusakawa, S. Yasuda, T. Kuroda, S. Kawamata, Y. Sato, Source: http://www.nature.com/articles/srep17892, Modification: Cropped, License: CC BY 4.0, http://creativecommons.org/licenses/by/4.0/

2 Title: Tumour-associated macrophages act as a slow-release reservoir of nano-therapeutic Pt(IV) pro-drug

3 Title: RNaseH1 regulates TERRA-telomeric DNA hybrids and telomere maintenance in ALT tumour cells
Authors: R. Arora, Y. Lee, H. Wischnewski, C. Brun, T. Schwarz, C. Azzalin, Source: http://www.nature.com/ncomms/2014/141021/ncomms6220/full/ncomms6220.html, Modification: Cropped, License: CC BY 4.0, http://creativecommons.org/licenses/by/4.0/