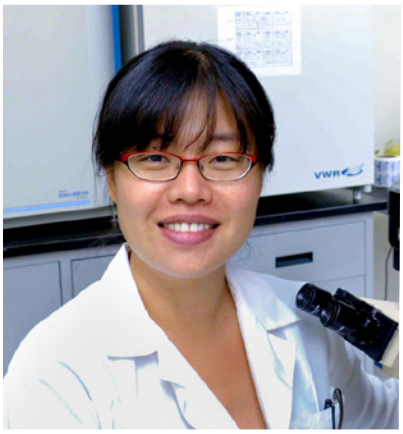
# Shining the Light on 3D Models for Ovarian Cancer

Promega Corporation



**Challenge:** Dr. Yang Yang-Hartwich uses a 3D cell culture model adapted for many different cell types and cell lines in her research. It can be difficult to find the optimal conditions to ensure cell viability and determine experimental time- and dose-dependent responses.

**Solution:** Luminescent-based assays from Promega provide accurate and reliable methods of visualizing cell health. The GloMax® Navigator applies an integrated approach for detection and analysis.

*"It's very helpful for researchers to give assays a try to see if it's suitable for their research. It's a good learning process." —Yang Yang-Hartwich, PhD*

Dr. Yang Yang-Hartwich is an Assistant Professor and early-career researcher in the Department of Obstetrics, Gynecology and Reproductive Sciences at the Yale School of Medicine. Her laboratory studies the origins of ovarian cancer, as well as the molecular pathways involved with drug treatment and resistance in aggressive cancers. She is enthusiastic about trying new assays that might benefit her research, valuing the importance of trial testing and validating reagents before doing a full study to see how they work with different cell culture models. She views this process of optimization as a learning experience that will help her meet—and exceed—her research goals.

## Using the Right Model to Learn Where Cancer Starts and Ends

*"The cells that grow better in 3D, they have a stronger ability to form a tumor in vivo, so somehow 3D survival/growth is related to tumor forming ability."*

Dr. Yang-Hartwich aims to understand how ovarian cancer starts. The current theory is that the origins of ovarian cancer trace back to fallopian tube cells. Her lab is creating in vitro and in vivo models to observe how rogue fallopian tube cells can survive and evolve into aggressive cancer cells. To begin, fallopian tube cells (which are epithelial in nature) attach and grow in a 2D environment—on a cell culture plate or flask. When Dr. Yang-Hartwich and her team introduce certain induction factors, however, the cells transform from functioning as epithelial cells into tumor precursor cells. At this stage, a 3D model is useful to evaluate the ability for the cells to survive and form a cancerous tumor.

The 3D model also serves Dr. Yang-Hartwich in her second research goal: to understand why patients become resistant to chemotherapy, and to develop new drugs that can better target chemo-resistant cells. Her lab observed that cancer cells grown in a 3D model—whether in suspension, by hanging-drop, or in a hydrogel matrix—are more physiologically relevant than those grown in a 2D model. Certain therapeutic drugs used clinically do not have the same effects in a 2D cell model, but 3D models align more closely with clinical results. If a cancer treatment doesn't effectively kill cancer cells, eventually the patient will develop resistance, so Dr. Yang-Hartwich's lab hopes to utilize the 3D model to identify better drugs and targeting methods for more efficient chemotherapy.

## A Many-Headed Beast—the Challenge of Working with 3D Models

*"It's fascinating to see these cancer cells and how they behave under different conditions—somehow they find a way to survive."*

Working with 3D models is not always easy, however. The Yang-Hartwich lab uses many different cell types and cell lines in their research, and finding the optimal conditions for each can be challenging. Depending on the condition, the cells may form spheroids that are too large, or some may not form at all. Especially when working with drug treatments, it is important to know how many cells to plate, the density, how long to treat them and other factors to demonstrate an accurate time- or dose-dependent response to the drug.

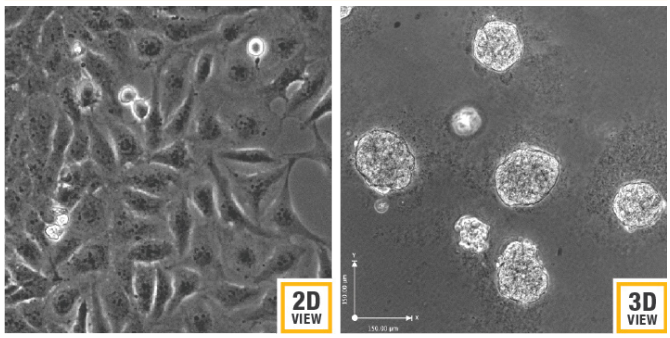
Early on, Dr. Yang-Hartwich and her team used the imaging-based IncuCyte® Instrument to capture cell growth in their 2D model, but were unable to monitor 3D spheroids using the same detection methods. To resolve this issue, they collected the spheroids and used trypsin to break them apart into single cells for imaging. However, this was not very accurate or reliable to quantify cell health for their research needs. Another solution was needed for their 3D model.

## Luminescent-Based Assays Offer a Reliable Solution

*"The procedure is designed nicely so it saves us time and it's easy to do—my high school student can do it! I give them the protocol to read and they can do it."*

Dr. Yang-Hartwich made the investment to acquire a GloMax® Navigator to support better luminescent-based assays with her 3D cell model. Working with her local Promega representative, she acquired a sample kit for the CellTiter-Glo® 3D Cell Viability Assay that her lab tested and validated for their research needs. With this protocol, Dr. Yang-Hartwich and her team can plate cancer cells as low as 500 cells per 96-well and are able to visualize cell growth and proper spheroid formation within 1–2 weeks. The lab also uses the Caspase-Glo® 3/7 Assay to determine endpoint activity in both their 2D and 3D models. Dr. Yang-Hartwich also sees potential for using the

Ovarian Cancer Cells from Human Tumor




RealTime-Glo™ MT Cell Viability Assay to get a better picture of cellular growth conditions in response to time- and dose-dependent treatments. Dr. Yang-Hartwich has found that the ability to incorporate these assays into the 3D model has opened up new opportunities to move forward in her research.

## An Integrated Approach Opens Windows of Opportunity

*"Since we have the instrument, it makes me want to learn more assays and what other assays I can run with this instrument. It brought a lot of opportunities for our work."*

Since the GloMax® Instruments come preloaded with protocols for Promega 3D assays, Dr. Yang-Hartwich found it easy to incorporate the assays into her workflow. She doesn't want to stop there. Looking forward, Dr. Yang-Hartwich hopes to test the Mitochondrial Tox-Glo™ Assay to see how different cancer drugs affect mitochondrial energy metabolism. She also sees value in the Dual-Luciferase® Reporter Assay to study closely related genes that affect metastasis. With an integrated solution for studying different aspects of cell health, Dr. Yang-Hartwich has the confidence to try new assays in the future.