# Nanofibrillar Cellulose Hydrogels for 3D Cell-Based Assays for High-Throughput Screening Analyses

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Precision medicine requires predictive, in vivo relevant and cost-effective tissue mimicking cell models. 3D cell culture with hydrogels has become a powerful tool for in search of more relevant clinical drug responses. GrowDex® hydrogels are plant-derived nanofibrillar cellulose hydrogels and shown to provide an effective and reproducible 3D matrix for various healthy and cancerous cell types. They resemble physically the ECM, support cell growth, spheroid formation, and allow free diffusion of small molecules: nutrients, drugs and oxygen. They are shear thinning and temperature stable, with tunable stiffness: ideal for automated 3D cell-based assays for drug discovery and development.

Ex vivo drug screening is to assess drug efficacy of vital tumour patient derived cells (PDCs). After 2D screening of 1160 FDA approved/investigational/preclinical drugs for metastatic urachal carcinoma cells, selected 90 drugs were more closely screened to compare 2D enzymatic assay vs. 3D GrowDex model for drug screening in high throughput image-based viability assay. All tested models captured the cells' sensitivity to the same drugs that could be associated with the oncogenic mutation specific to this cancer. Specific drug classes showed differences in dose responses 2D vs. 3D.[1] Also, suitability of GrowDex and widely used Matrigel was tested side-by-side as 3D culture matrices for drug sensitivity and resistance testing in a high-throughput mode (3D-DSRT). Optimizations were performed with hepatocyte cell line (HepG2) with two methods: pre-culturing or pre-drugging and compared to traditional 2D model with a viability assay. Followed by sensitivity testing of ovarian cancer PDCs from 2 patients. The PDCs were tested with 52 drugs in 5 different concentrations using 3D-DSRT. This proof-of-concept study showed the growth condition and matrix dependent differences in drug sensitivities of ovarian cancer PDCs.[2]

**REFERENCES:** [1] Mäkelä et al. (2020) Ex vivo modelling of drug efficacy in a rare metastatic urachal carcinoma *BMC Cancer* **20**:590. [2] Feodoroff et al. (Manusript in review, submitted) Comparison of different supporting matrices in the established 3D drug sensitivity and resistance testing assay (3D-DSRT) for patient-derived cancer cells.