The CODRP model for predicting drug sensitivity in patient-derived 3D gastric cancer cells

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Introduction
• Gastric cancer exhibits molecular heterogeneity with aggressive behavior and treatment resistance (Yan et al., 2018, Cell Stem Cell).
• Therefore, effective in vitro models that reflect the characteristics of the individual patients are urgently needed for therapy response testing (Sigrid A Langhans, 2018, Front. Pharmacol.).
• If drug sensitivity can be evaluated in-vitro using the patient-derived primary cancer cell with High Throughput Screening (HTS), it may be the most suitable platform for precision medicine development (Lau et al., 2022, EMBO Mol Med.).
• In our previous study, we established a novel HTS system using 143 patients- derived 3D gastric cancer cells as a drug screening platform.
• Here, we propose a multi-parameter analysis method (cancer organoid-based diagnosis reactivity prediction, CODRP) that considers the cancer stage and cancer cell growth rate, which represent the severity of cancer patients, in the drug sensitivity test.

High-throughput organo-on-pillar (high-TOP) array system for three-dimensional ex vivo drug testing

Overview of Experimental Procedures using Gastric Cancer cells

Overview of Spotter platform

Cancer Organoid based Diagnosis Reactivity Prediction (CODRP) based Drug Sensitivity Analysis

Conclusion
• We can obtain drug response data within 2 weeks using GC primary tissues directly in the HTS system (MBD Spotter platform)
• 3D cultured gastric cancer cells maintain primary tumor characteristics
• We propose the CODRP based drug sensitivity analysis algorithms and successfully predict the recurrent gastric cancer patient by CODRP index.