



神戸大学

An iPSC-Based Cancer Stem Cell Platform for Target Discovery and Drug Screening

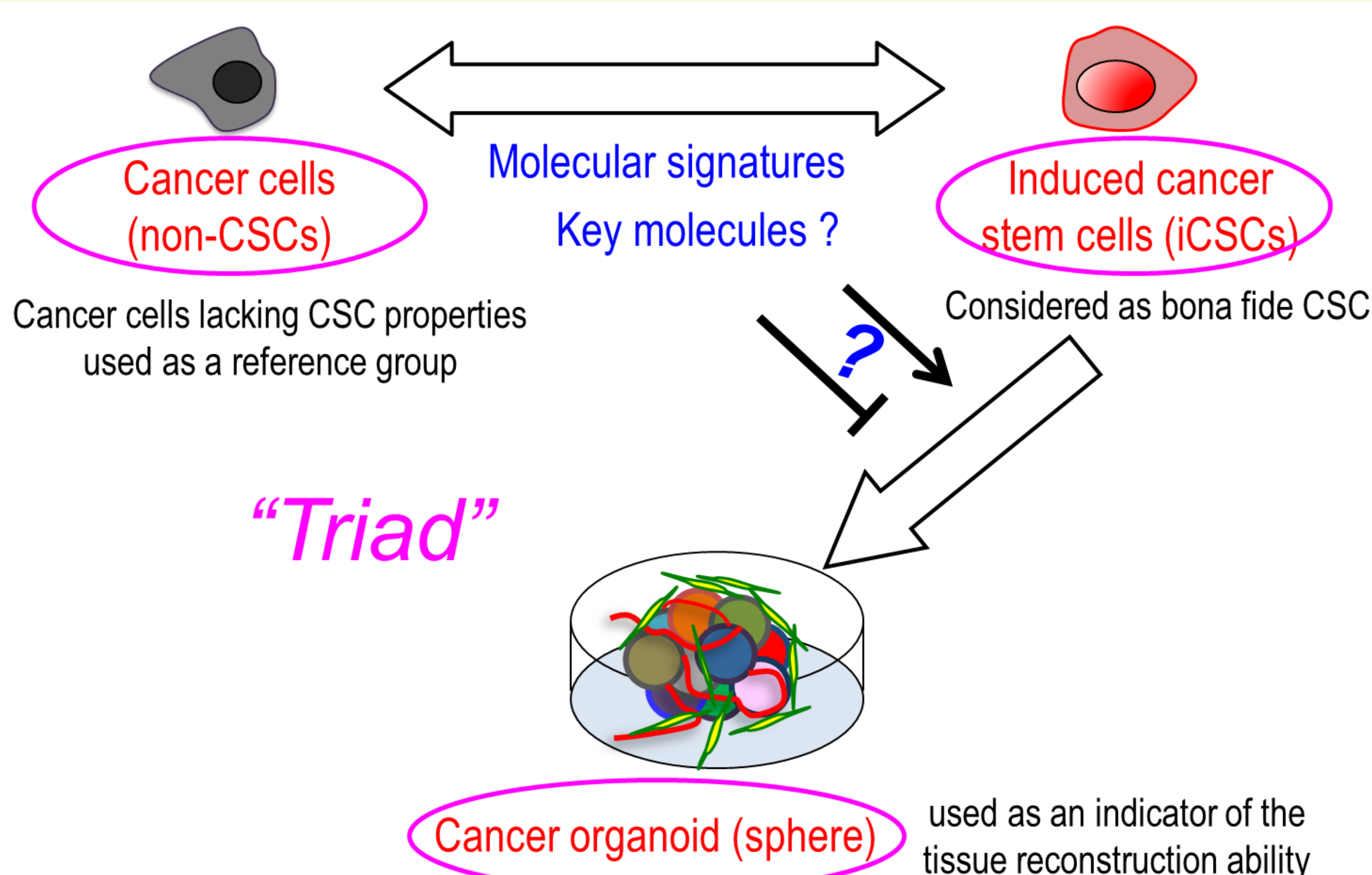
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Background: Cancer stem cells (CSCs) are a rare tumor subpopulation associated with recurrence, metastasis, and therapy resistance. However, their scarcity, heterogeneity, and culture instability limit mechanistic studies and drug screening. Reproducible CSC-like models are needed to identify therapeutic targets and evaluate CSC-directed therapies.

Existing Models and Limitations: Current CSC research uses patient-derived cells, cancer cell lines, and organoids. While valuable, CSC scarcity, culture instability, and sample heterogeneity limit reproducible studies and large-scale screening. Obtaining sufficient CSCs from patient-derived organoids remains a major bottleneck.

Technical Significance

Concept: The “Triad” platform combines non-CSCs, induced cancer stem cells, and cancer organoids to reveal CSC-specific vulnerabilities and identify therapeutic targets for drug discovery.



Target Discovery Using iCSC-Based Models:

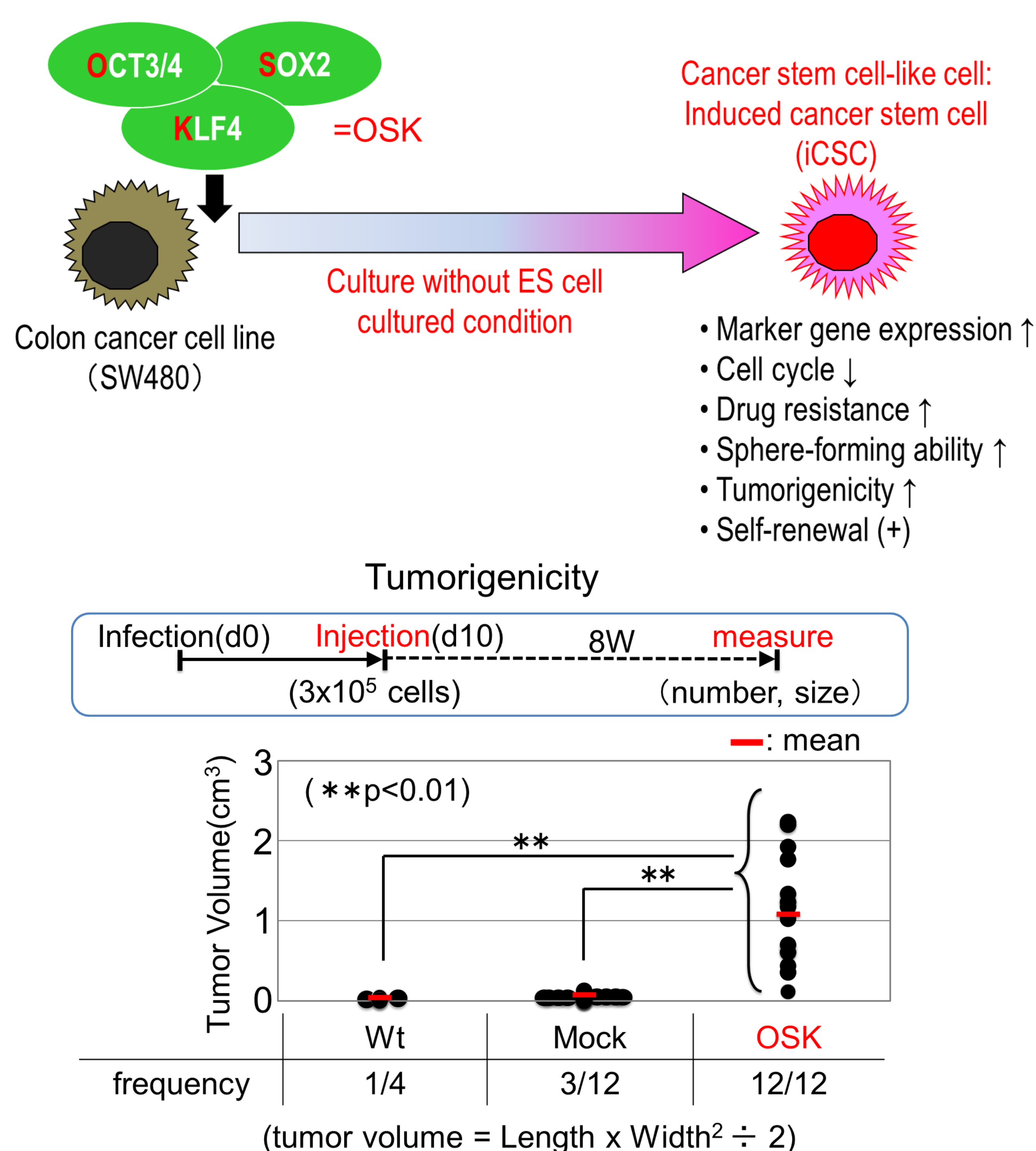
iCSC-based models enabled the identification of cancer type-specific pathways regulating CSC activity, including IL-6 signaling in lung cancer and Plexin-related pathways in colorectal cancer.

These findings were further supported by subsequent studies*.

* Ogawa et al., Scientific Reports, 2017; 7:12317

* Borrelli et al., Nature, 2024; 632: 411

Colon iCSCs: Defined-factor reprogramming generated colorectal iCSCs with sphere-forming, tumorigenic, drug-resistant, and self-renewing properties, providing a reproducible model for CSC-focused drug evaluation.



Future Prospects

Possible Applications:

- CSC-targeted drug screening using iCSCs and cancer organoids
- Target discovery for CSC maintenance, therapy resistance, and tumor reconstruction
- Evaluation of drug responses in tumor microenvironment-mimicking organoid models
- Development of combination therapies with existing anticancer drugs

Possible Collaboration:

- Licensing of iCSC generation and cancer organoid technologies
- Know-how transfer for CSC-based screening and evaluation
- Collaborative validation using partner compounds or target candidates
- Platform application to partner-selected cancer types

Publications & IP:

- Oshima et al., PLoS ONE, 2014
- Ogawa et al., Scientific Reports, 2017; 7:12317
- Ishida et al., Molecular Cancer Research, 2017
- JP6795410, JP7141125, US12351830, JP6956398

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