Meet the professor

www.sgo.or.kr

# Sharing preclinical research experiences

**Jeong-Won Lee** ***MD, PhD***

***Department of Obstetrics & Gynecology, Samsung Medical Center,***

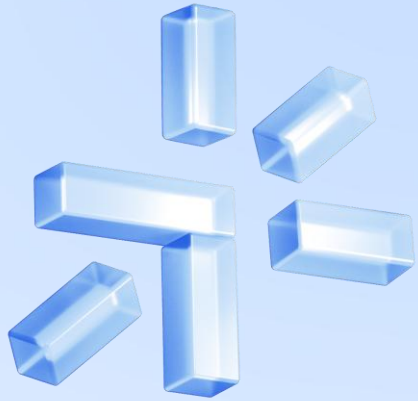
***Sungkyunkwan University School of Medicine, Seoul, Korea***

# DECLARATION OF INTERESTS

Clinical consultant – MBD inc

SAMSUNG MEDICAL CENTER

SUNG KYUN KWAN UNIVERSITY(SKKU)



# Meet the professor

# Sharing preclinical research experiences

## From Bench to Bedside, and Back Again

**Jeong-Won Lee , *MD, PhD***

*Department of Obstetrics & Gynecology, Samsung Medical Center,*
*Sungkyunkwan University School of Medicine, Seoul, Korea*

# Agenda

**Part 1** Introduction
- What is Translational Research & Why GYN Surgeons Need It

**Part 2** My 20-Year Journey: GYN Cancer Translational Research
- From IHC to Animal models (CDX, PDX) / PDO
- SMC GYN Cancer Translational Research Team

**Part 3** A Mentor's Guide
- Practical Advices on How Young GYN Oncologists Can Start

**Part 4** Concluding Remarks & Open Q&A

# Jeong-Won Lee, MD, PhD

- Professor, Department of Obstetrics & Gynecology
- Samsung Medical Center, Sungkyunkwan University School of Medicine



## Clinical Practice

**Outpatient Clinic** Tuesdays (AM/PM) & Fridays (PM)
Approx. 180–200 patients per week

**Surgical Practice** Mondays & Thursdays
30–35 cases per month (> 90% Gynecologic Cancers)

**Indications** Cervical, Ovarian, and Endometrial Cancers

**Modalities** Robotic, Laparoscopic, and Open Surgeries



## Translational Research

***"Surgical practice alone cannot drive future medical progress."***

**Translational Research Team** Weekly Lab Meetings (Fridays, 12:00 PM)

**Leadership** Immediate past president, Korean Gynecologic Cancer Research (KGCR)

**Mission** Bridging clinical challenges with laboratory innovations to improve patient outcomes

01

PART 1 - INTRODUCTION

# What is Translational Research & Why GYN Surgeons Need It

# 중개연구의 개념

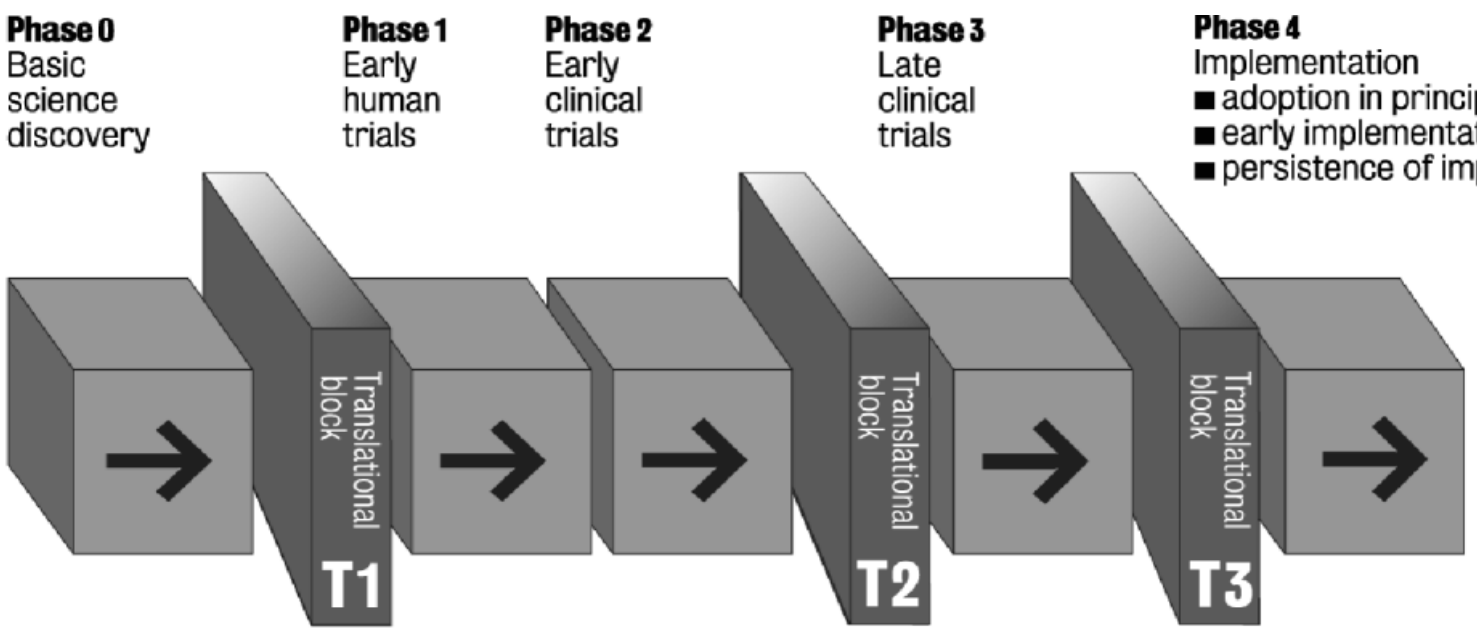
| 번역 대상 | 번역의 관점 | 번역 수요자 |
| --- | --- | --- |
| 기초연구를 | • 질병 관점 (disease-oriented)에서<br>• 환자 기반 (patient-based)으로<br>• 임상적 유용성 (clinical utility)을 평가해서 | 임상으로 |

**“번역”** 해서 → **“연결”** 한다

대학/연구소에서 기업 (병원) 으로 연결

기업 (병원) 에서 임상 진료 현장과 공중보건 시스템으로 연결

# The place of implementation science in the translational medicine continuum




- **T1** - ***developing*** *treatments and interventions.*
- **T2** - ***testing*** *the efficacy and effectiveness of these treatments and interventions.*
- **T3** - ***dissemination*** *and implementation research for system-wide change.*

*http://www.tcrn.unsw.edu.au/translational-research-definitions*

# T1 Stage Research (Bench to Bedside)

## From Bench to Clinic



The T1 stage represents the initial Phase-I bridge linking basic scientific discoveries to human medicine, serving as the essential first step to apply new concepts to actual clinical settings.

## Expanded Lab Validation



Researchers establish scientific Proof of Concept (PoC) by utilizing a combination of healthy human samples, complex cell models, and animal models.

## Next-Gen Therapies



By elucidating mechanisms at the genetic and protein levels, T1 research provides the foundational data necessary for developing breakthrough diagnostic technologies and novel drugs.



# Concept & Scope of Translational Research

**Translational research is a multidisciplinary model designed to apply the discoveries of basic science directly into clinical practice.**

- Laboratory Human Sample Research: Any basic medical research utilizing human tissues, blood, or other specimens falls entirely under translational research.
- Progressive Expansion of Scope: Moving beyond simple human sample analysis, the field is gradually expanding into ***cell experiments (In vitro)*** and ***animal models (In vivo)*** to elucidate complex disease mechanisms.

# Beyond the Scalpel: The Limits of Surgery

## 1. ANATOMY (What the Scalpel Can Control)

- **Local Debulking Success:**
  Excellent at removing visible macrometastatic tumor masses (R0).
- **Physical Limits:**
  A static resection of a physical mass in a specific, localized operating field.

## 2. BIOLOGY (What the Scalpel Cannot Touch)

- **Systemic & Microscopic:**
  Hidden microscopic metastases and circulating tumor cells evade the blade.
- **Genomically Dynamic Enemy:**
  Intrinsic drug resistance, genetic heterogeneity, and clonal evolution remain.

***"We can debulk the anatomy, but we cannot excise the biology."***

To break the physical limits of our hands, we must expand our clinical questions into experimental therapeutics.

# Bed-to-Bench: GYN Surgeons Hold the Key

- **Only surgical oncologists have direct control over the goldmine of translational research**

## 1. Bed-to-Bench is Within Your Capability

**Ask Clinical Questions:**

You do not need to be a full-time Ph.D. scientist. Defining the patient's 'unmet therapeutic need' is the hardest and most critical part of research.

**Direct Patient Match:**

Clinicians seamlessly connect clinical outcomes, therapy timelines, and drug responses back to experimental models.

## 2. The Privilege of Fresh Tissue Acquisition

**We Hold the Gate to the Goldmine:**

Functional precision medicine (PDO/PDX) depends entirely on fresh, viable human tumor samples directly obtained from the O.R.

**Ph.D.s Cannot Get Tissues Alone:**

Excellent laboratory scientists lack access to the operating room. Without you, their advanced screening technologies have no clinically-relevant input.

# The GYN Surgeon's Unfair Advantage

- **Why clinicians - not just laboratory PhD. - must orchestrate GYN cancer research**

THE O.R. GOLDMINE

## Direct Tissue Custody

The foundation of functional models (PDX & 3D organoids) is high-quality, viable fresh patient tissue. The operating surgeon is the only person who can harvest and secure this precious material.

CLINICAL CONTEXT

## Bridging Data & Reality

Genomic profiles are meaningless without clinical histories. Only the treating physician understands the patient's real-world treatment response, chemotherapy timeline, and recurrence dynamics.

THE DRIVING KEY

## Patient-Centered Focus

While laboratory Ph.D.s hold advanced analytical tools, GYN surgeons hold the clinical keys. We define the translational loop because we live with the patient's bedside outcomes.

PART 2 - RESEARCH

# My 20-Year Journey: GYN Cancer Translational Research

- From IHC to Animal models (CDX, PDX) / PDO
- SMC GYN Cancer Translational Research Team

# Our 20-Year Milestone: Evolutionary Journey of SMC GYN TR Team

- **A continuous adaptation of research models and technologies since 2005**

**2005 - 2011**

## The Dawn (IHC Era)

Paraffin blocks & IHC
Claudin-7 / Matriptase
etc

**2011 - 2015**

## Cell Lines & Models

*In vitro* & *In vivo*
Orthotopic mouse models
Omeprazole chemosensitivity

**2015 - 2026**

## Avatar Mouse (PDX)

500+ GYN Cancer cases

**2020 - 2025**

## Organoid (PDO)

High-TOP HTS Platform
14-day ex vivo assay
CODRP index
clinical RFS trial

**2026 - Future**

## Next-Gen Medicine

ADC
New drugs

# Initiating Translational Research: A Milestone in My Career

- **Claudin-1 & 7 in Cervical Neoplasia (Gynecol Oncol. 2005), 146 citated**

## Methodology

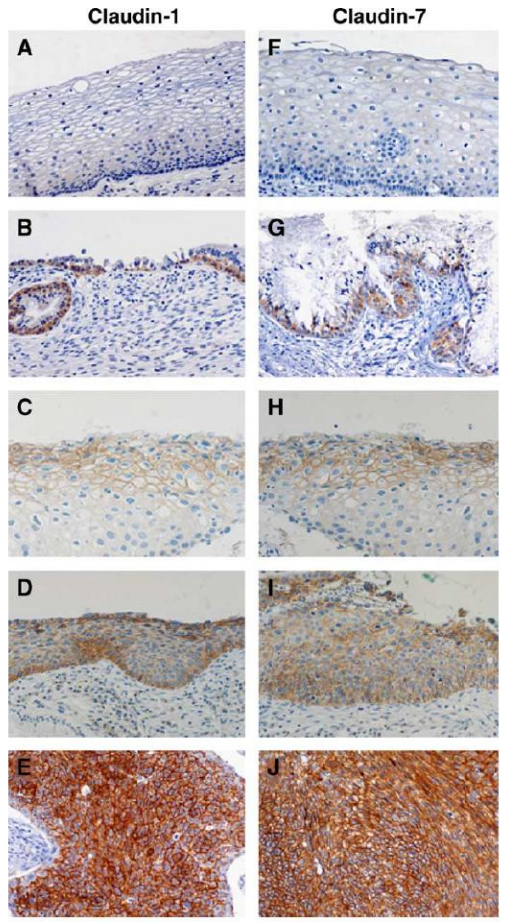
**Objective:** Investigate the role of tight junction proteins (Claudin-1 & 7) in the progression of uterine cervical neoplasia.

**Samples:** 89 formalin-fixed paraffin-embedded tissues ranging from normal to invasive cancer (10 Normal, 19 LSIL, 20 HSIL, 40 ISCC).

**Analysis:** Immunohistochemistry (IHC) staining evaluated blindly by two specialized gynecological pathologists.

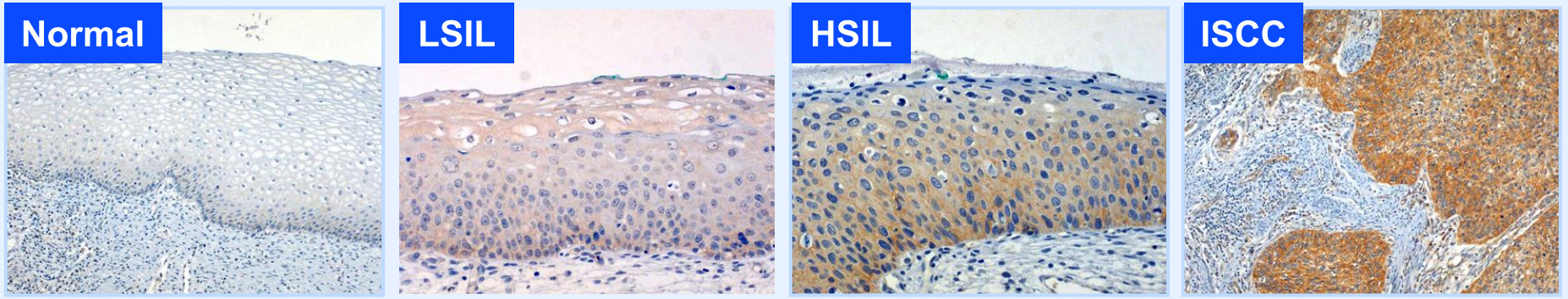
## Key Findings & Conclusion

| | |
|---|---|
| Normal | Undetectable in normal squamous epithelium (0%). |
| Progression | Expressions **gradually and significantly increased** from LSIL to HSIL and ISCC |
| Invasive | Detected in 100% of Invasive Squamous Cell Carcinomas. |
| Conclusion | Claudins act as significant early markers for the malignant transformation of cervical cells. |



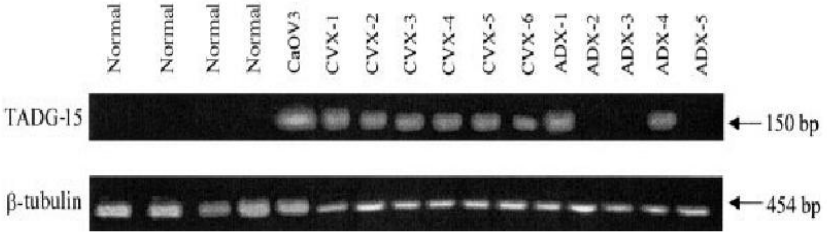
# IHC (continued)

- **Matriptase** in Cervical Neoplasia (Hum Pathol. 2005)



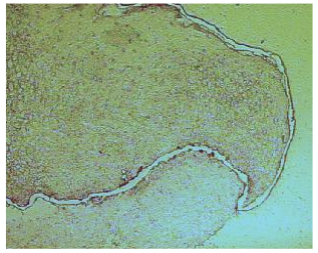

**Galectin-3** in Cervical Neoplasia (JCRCO. 2005)

**eIF-4E** in Cervical Neoplasia (Hum Pathol. 2005)




**Toll-like receptor 9** in Cervical Neoplasia (Molecular Carcinogenesis 2007)

**Toll-like receptor 5** during progression of cervical neoplasia (IJGC 2008)

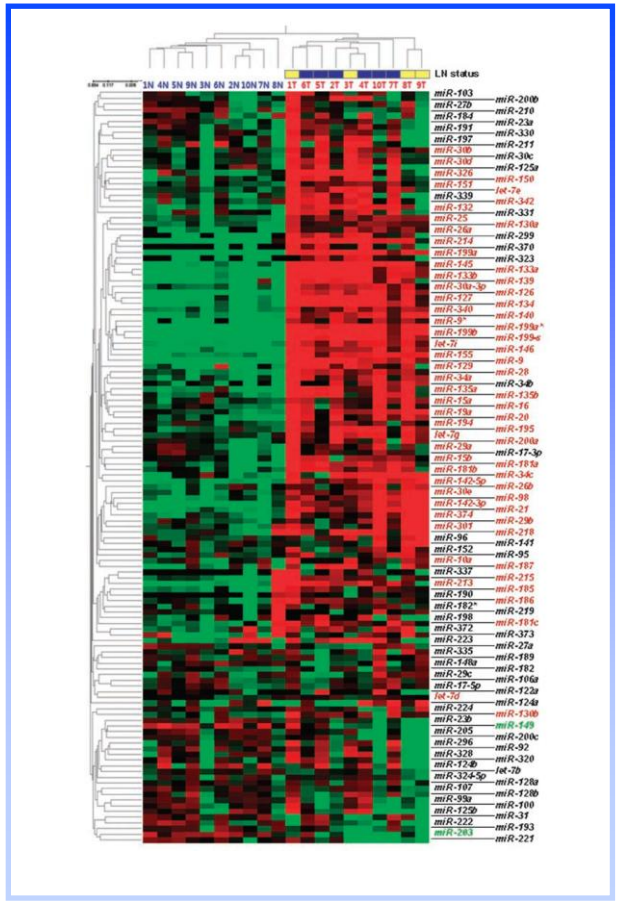


# MiroRNA study (Clin Cancer Res. 2008)

## Altered MicroRNA Expression in Cervical Carcinomas

Jeong-Won Lee,[1] Chel Hun Choi,[1] Jung-Joo Choi,[1] Young-Ae Park,[1] Seung-Jun Kim,[2] Seung Yong Hwang,[2] Woo Young Kim,[1] Tae-Joong Kim,[1] Je-Ho Lee,[1] Byoung-Gie Kim,[1] and Duk-Soo Bae[1]

457 citated



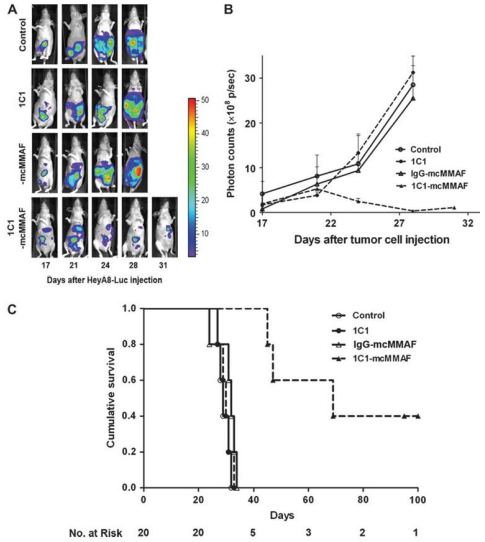
**The expression of the miRNA-200 family in endometrial endometrioid carcinoma.**
Lee JW, Park YA, Choi JJ, Lee YY, Kim CJ, Choi C, Kim TJ, Lee NW, Kim BG, Bae DS. **Gynecol Oncol. 2011 Jan**

**The interactions between MicroRNA-200c and BRD7 in endometrial carcinoma.**
Park YA, Lee JW, Choi JJ, Jeon HK, Cho Y, Choi C, Kim TJ, Lee NW, Kim BG, Bae DS. **Gynecol Oncol. 2012**

# 2007-2008 MDACC, Sood Lab

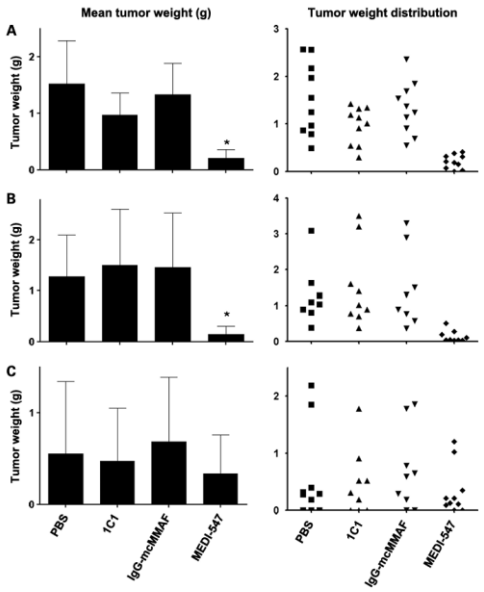
*J Natl Cancer Inst 2009*

**EphA2 immunoconjugate as molecularly targeted chemotherapy for ovarian carcinoma**



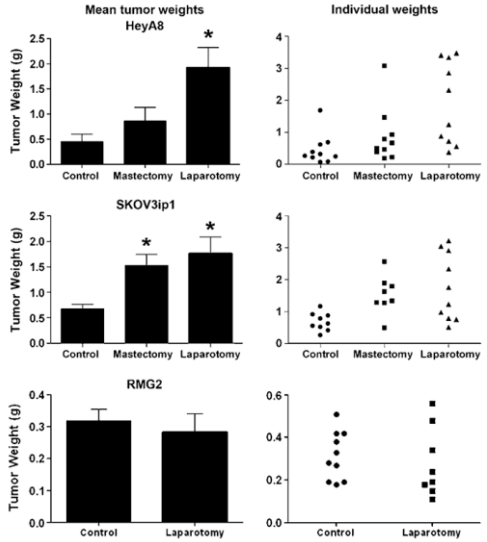

*Clin Cancer Res 2010*

**EphA2 targeted chemotherapy using an antibody drug conjugate in endometrial carcinoma**

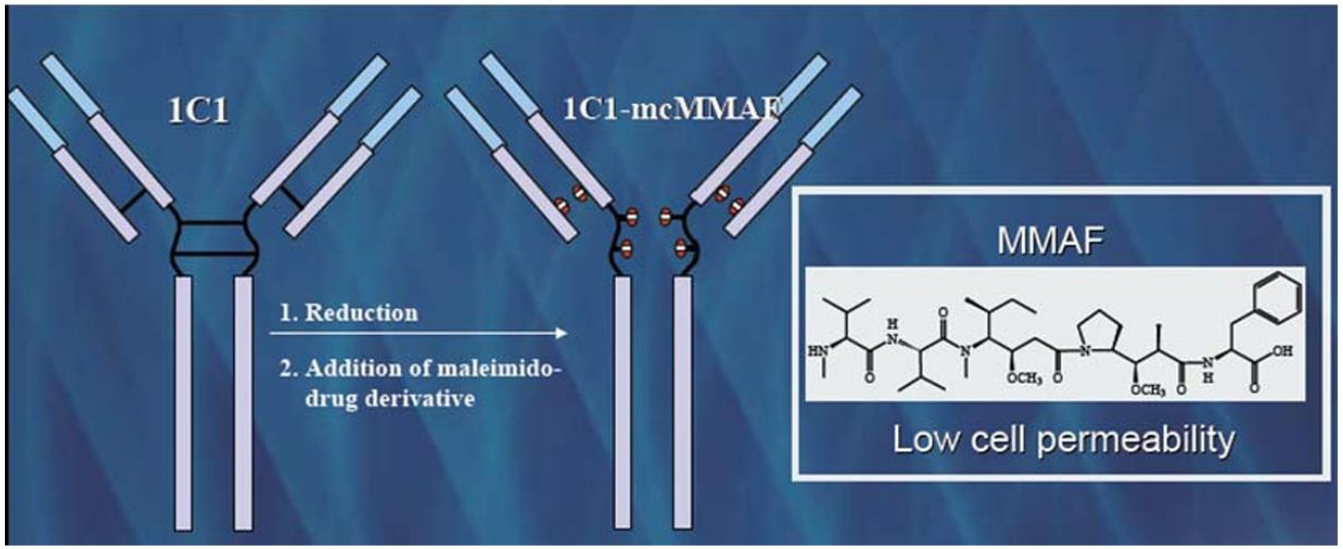



*Clin Cancer Res 2009*

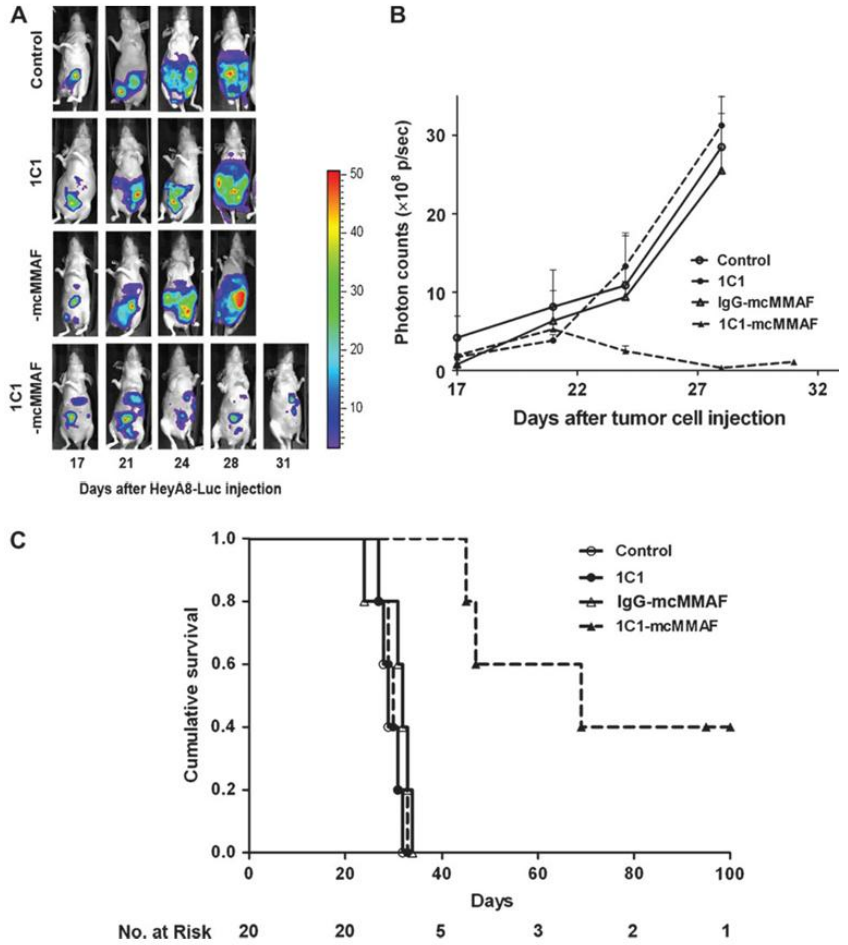
**Surgical stress promotes tumor growth in ovarian carcinoma**



# ADC, EphA2 immunoconjugate (2007. Medimmune)



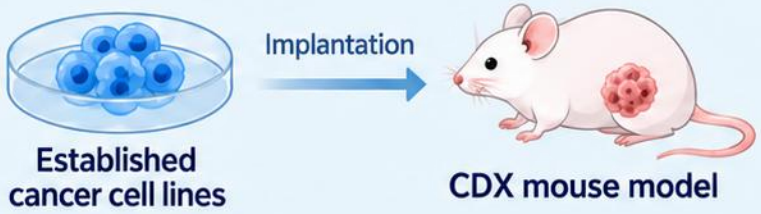

- Mechanism of action: Tubulin polymerization inhibitor
- More potent than doxorubicin (>100 potent than doxorubicin)
- ADCs with 4drugs/mAb are conjugated using a noncleavable linker maleimidocaproyl (mc).
- Drug is released via antibody degradation.
- Preserved binding characteristics, high yield




J Natl Cancer Inst 2009

# Animal model & PDX

## Mouse Models using Established Cancer Cell Lines (CDX)




## Patient-derived Tumor Xenografts (PDX)

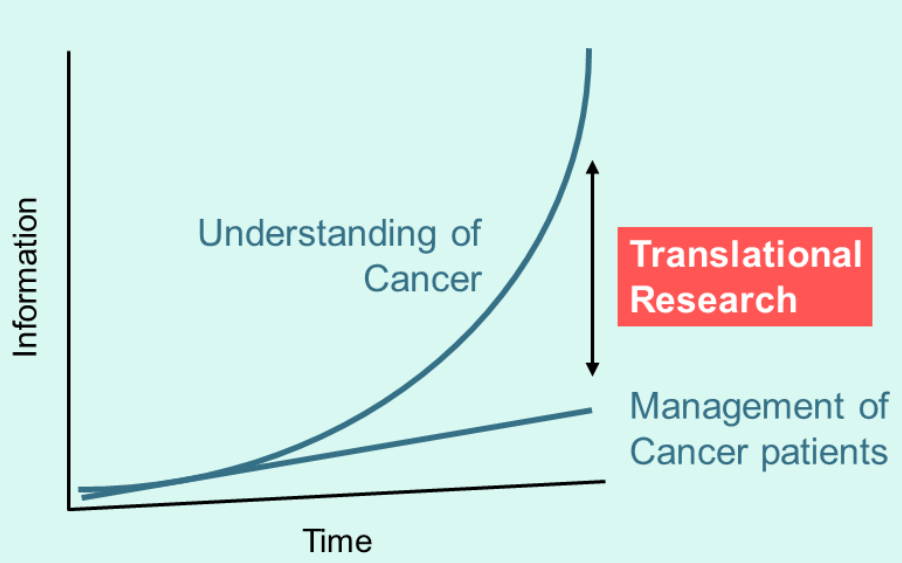



## Development

## Applications

# Mouse models for cancer research

- **Why use mouse models?**




Clinical Practice

Basic Research



*How do we effect this interactive, integrated approach cost-effectively, consistently, and rapidly?*

# Mouse models for cancer research

### Outbred Mice
- CD-1
- SKH1
- CF-1
- PGP
- Swiss Webster(CFW)

### Inbred Mice
- BALB/c
- C3H
- C57BL/6N
- DBA/1
- DBA/2
- The Pound Mouse
- FVB
- Fox Chase CB17
- 129
- SJL
- NC/Nga

### Hybrid Mice
- B6D2F1
- B6C3F1
- CD2F1
- CB6F1

### Immuno-Deficient Models
- BALB/c-nude
- CD-1 nude
- NU/NU
- NIH-III
- Fox Chase SCID
- Fox Chase SCID Beige
- NOD SCID
- SCID Hairless Outbred (SHO)

### JAX Mice
- 129S1/SvlmJ
- A/J
- C57BL/6J
- FVB/NJ
- NOD/ShiltJ
- AKR/J
- TALLYHO/JngJ
- SJL/J
- B6CBAF1/J
- B6SJLF1/J
- B6D2F1/J
- NZBWF1/J
- C57BL/6J-ApcMin/J
- NOD.Cg-Prkdcscid Il2rgtm1Wjl/SzJ
- B6.129P2-Apoetm1Unc/J
- NOD.CB17-Prkdcscid/J
- B6.V-Lepob/J
- BKS.Cg-Dock7m +/+ Leprdb/J
- B6.129S7-Rag1tm1Mom/J
- B6SJL-Tg(SOD1*G93A)1Gur/J
- www.jax.org

### BALB/c Nude Mice

**학명 :** CAnN.Cg-Foxn1nu/ CrljOri

**유래 :** 유래 : BALB/cABorn-nu와 Charles River Laboratoies Janpan(CRLJ)의 BALB/cAnCrj-nu를 crosses와 back-crosses시켜 개발함.
순종의 임신한 암컷BALB/cAnCrj-nu는 1985년 CRLJ로부터 받음.
이 마우스는 inbred이며, 유전자 모니터링을 통해 BALB/c nude로 결정됨.
Thymus 결핍인 이동물은 T-cells를 생산할 수 없는 면역결핍임.
2002년 (주)오리엔트바이오로 도입.

**모색 :** Hairless, albino background

**적용 :** Tumor biology and xenograft research

**특징/용도**
- 전신 무모증과 흉선이 없어 유래
- 림프구가 결여되어 있다
- 발암물질에 의한 발암성이 높으며 각종 종양 이식이 가능하다
- 면역학 및 발암연구에 이용



# Mouse models for cancer research

- Orthotopic vs. Heterotopic model
- Allograft vs. Xenograft (transplantation)

  Syngenic (isograft) vs. Xenogenic
- Genetically modified

  - Transgenic animals: Carrying one or more foreign genes

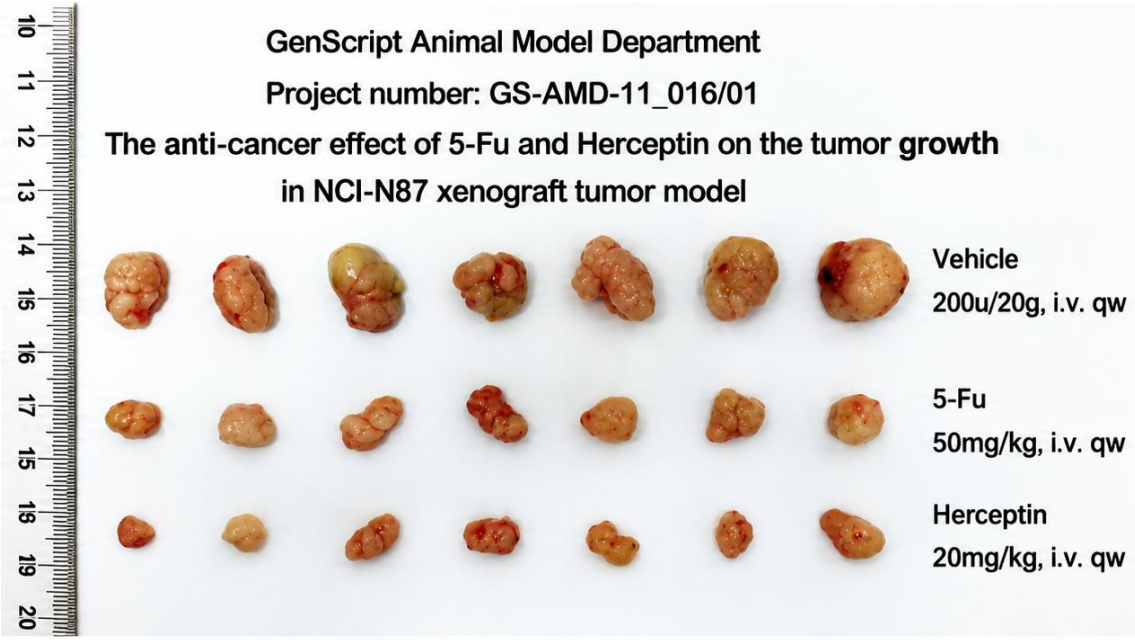
  - Targeted modifications: Knock-out / -in mice

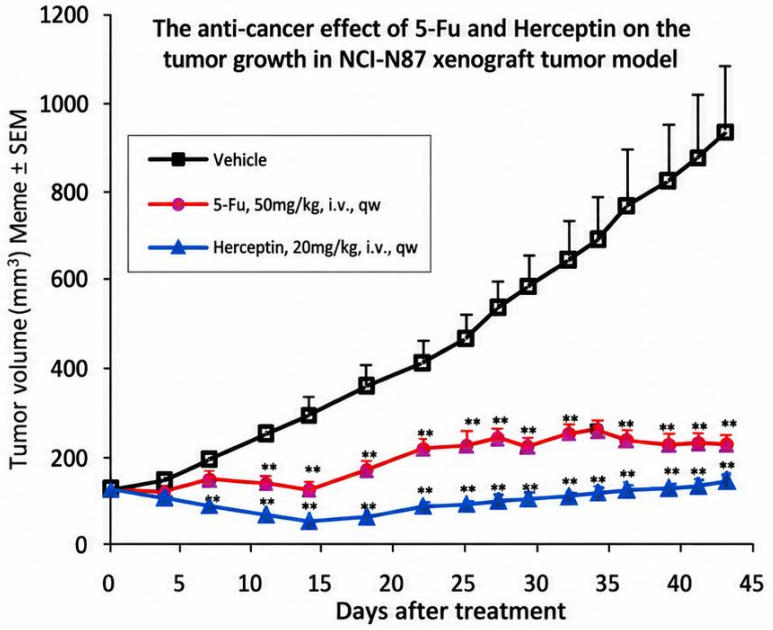
*In Vivo* Drug Efficacy Evaluation
(Therapy experiment)

1. Subcutaneous tumor models
2. Orthotopic tumor models
3. Metastatic tumor models
4. *In vivo* bioluminescence imaging
5. Syngeneic tumor models

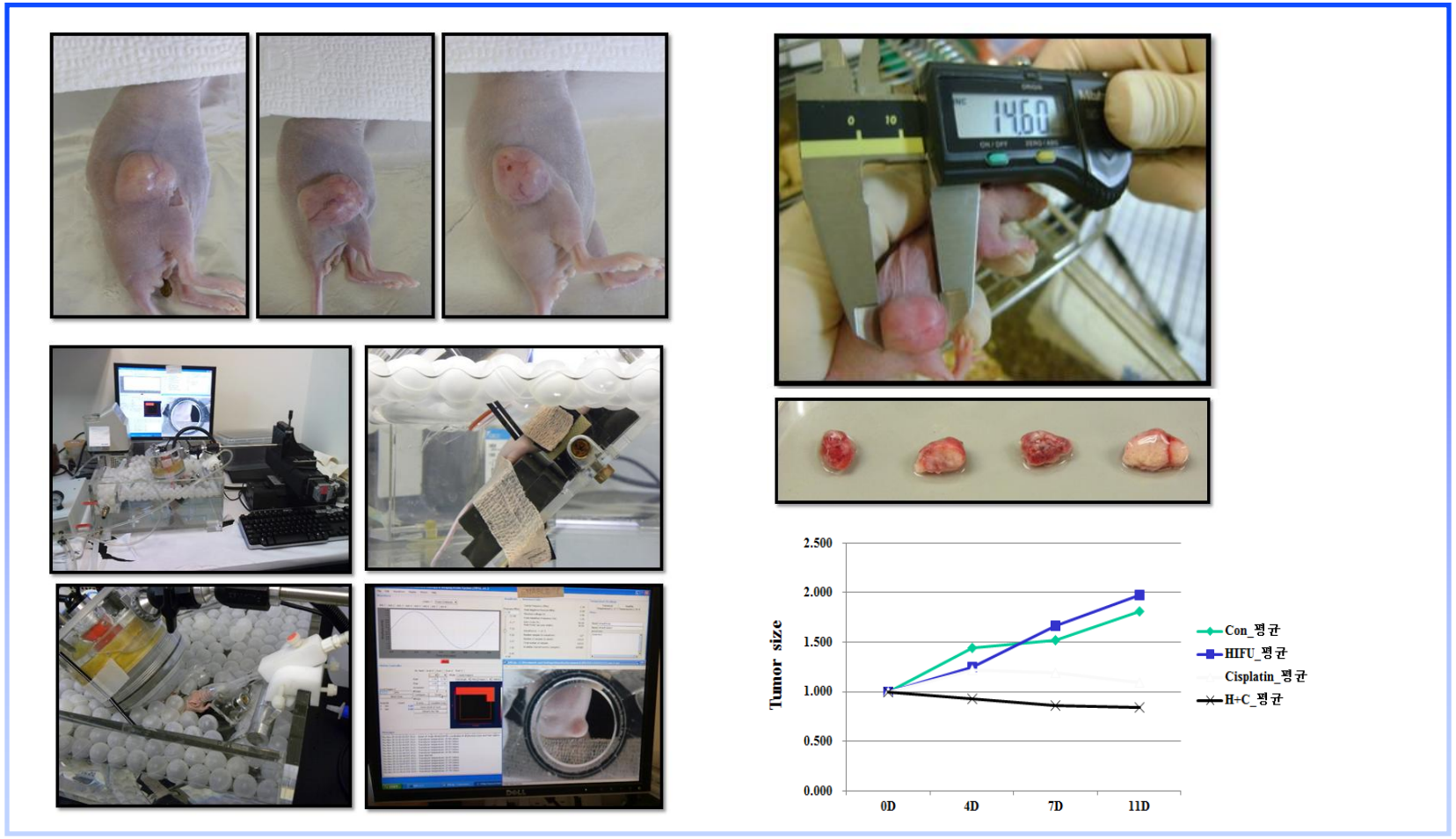
# *In Vivo* Drug Efficacy Evaluation (1): SC Xenograft

**Subcutaneous xenograft tumor models :** valuable for predicting cytotoxicity of cancer drugs and widely used in efficacy studies for its simplicity and easy access to tumor measurement.



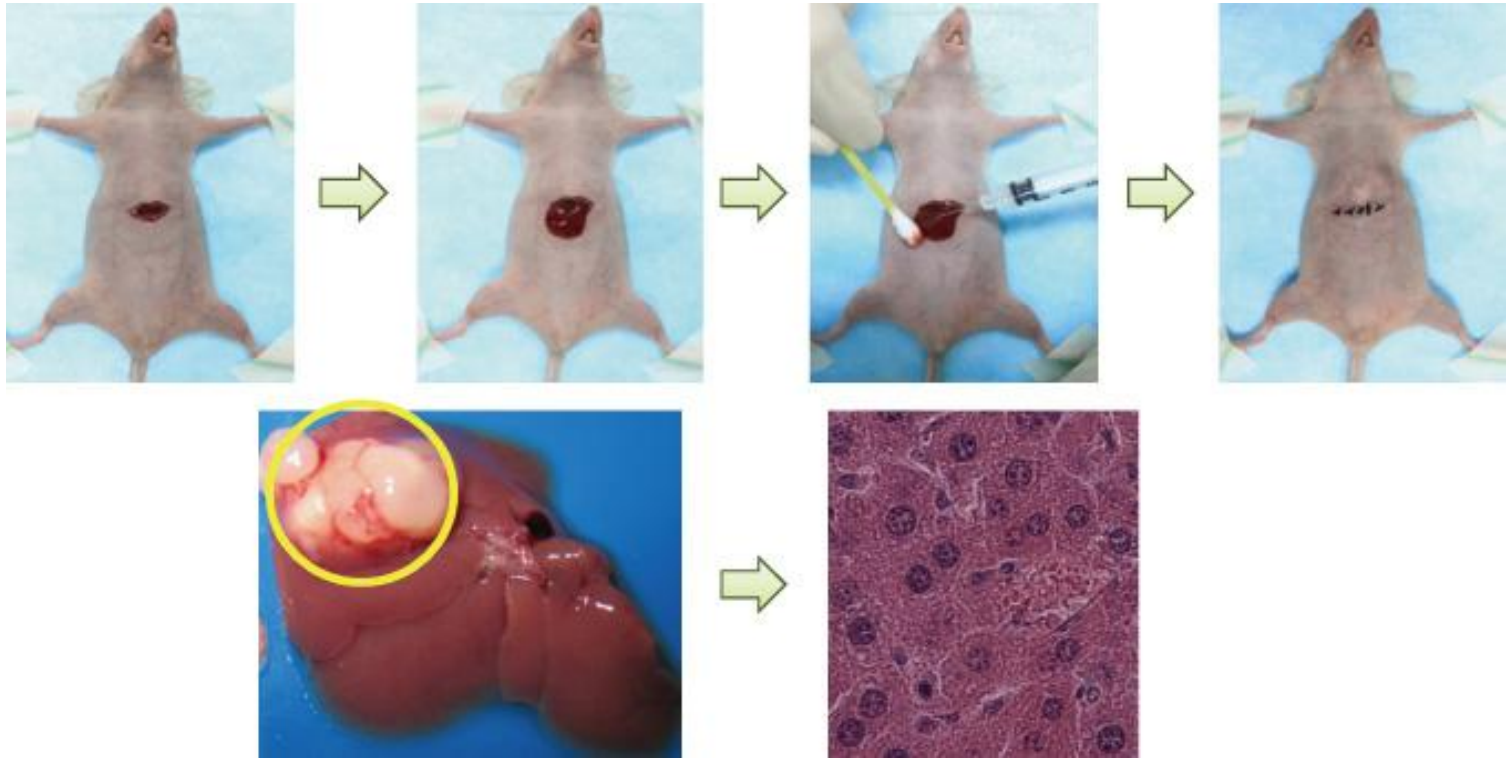
# The Effect of HiFU in Combination with Cisplatin using a Xenograft Cervical Cancer Model




*Anticancer Res. YY Lee & JW Lee, 2012*

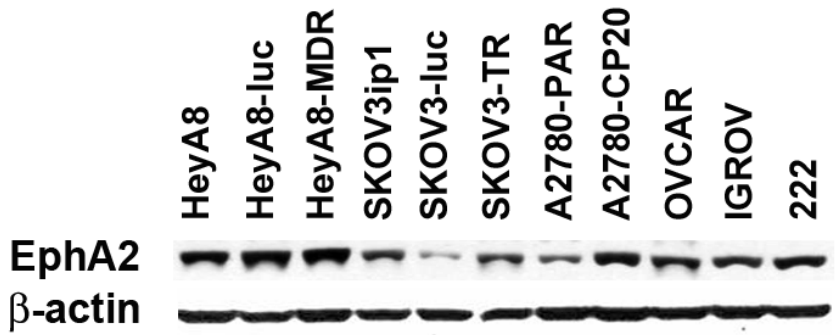
# *In Vivo* Drug Efficacy Evaluation (2): Orthotopic

**Orthotopic tumor models :** Organ **microenvironment** can influence the response of a tumor to a drug; therefore, it predict the drug efficacy with high clinical relevance and low false positive rate.



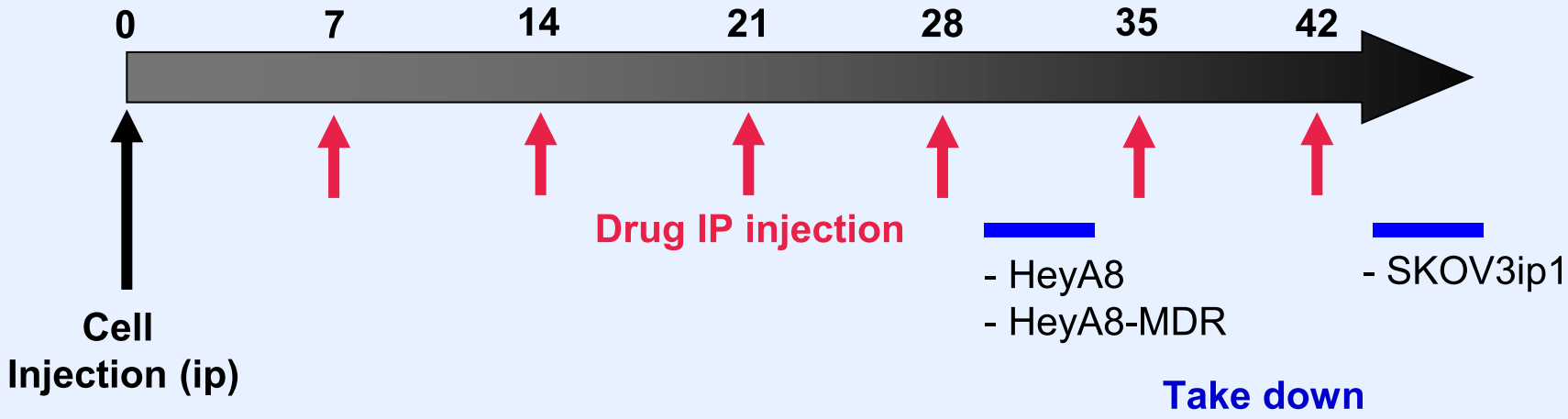
# *In Vivo* Drug Efficacy Evaluation (2): Orthotopic

- **Cell lines:**
  - **Ovarian:** HeyA8, SKOV3ip1, HeyA8-MDR, A2780-par, A2780-CP20….
  - **Endometrial**: Ishikawa, Hec-1A….
- **Murine Species:** Athymic female nude mice, 10 mice/group
- **Number of cell injected:** ¼ million to 4 million cells in 200 ul HBSS
- **Human ovarian cancer cell lines**

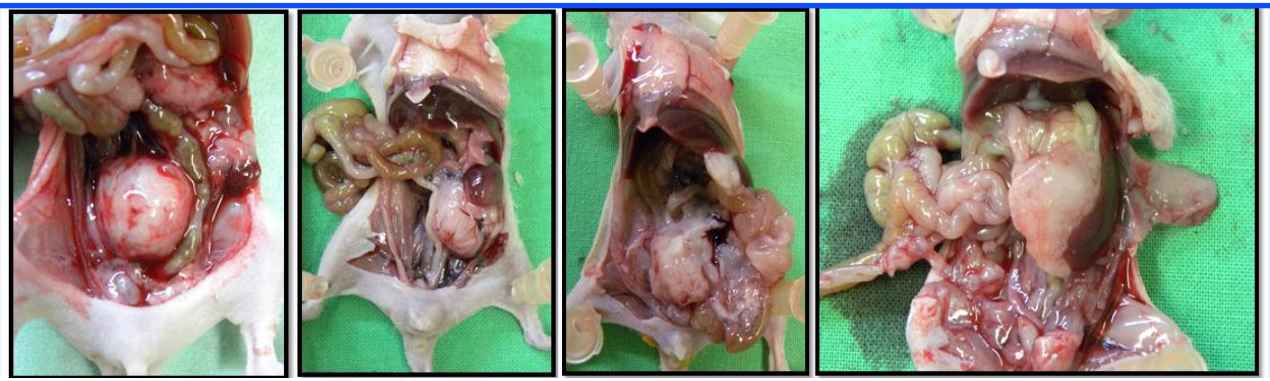
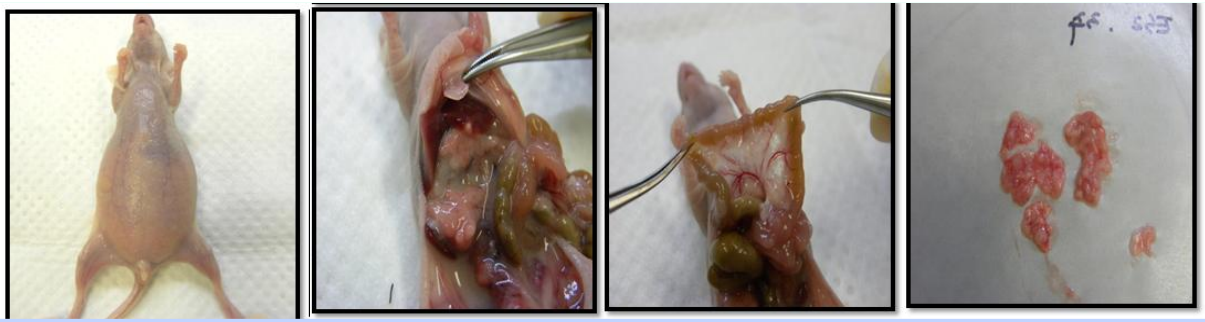


# *In Vivo Therapy Experiments using EOC Orthotopic Model*

- **Cell lines:** HeyA8, SKOV3ip1, HeyA8-MDR, A2780-par, A2780-CP20…
- Murine Species: Athymic female nude mice, 10 mice/group
- **Treatment groups**
  - **Group 1: PBS, once a week**
  - **Group 2: Drug X**
  - **Group 3: Drug Y**
  - **Group 4: Drug X + Y**

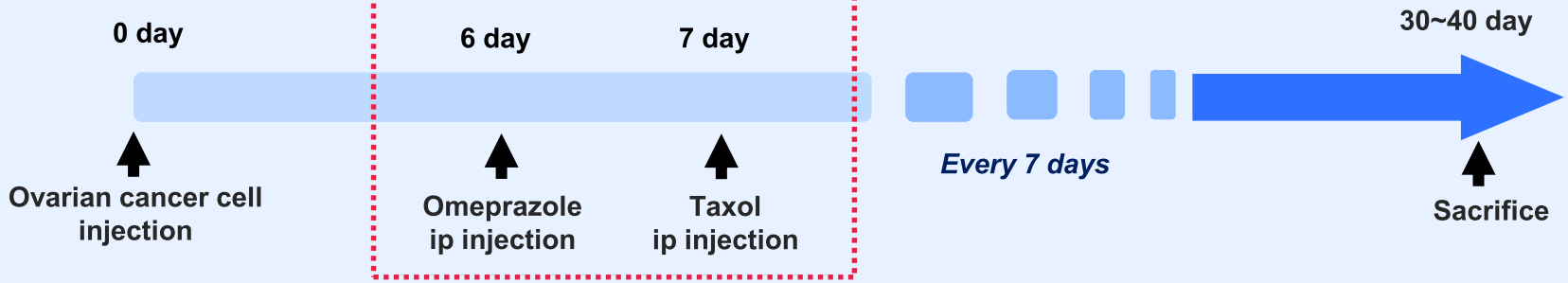


# Ovarian Cancer Orthotopic Model

| | |
|---|---|
| HeyA8 |  |
| A2780 |  |
| ES2 |  |

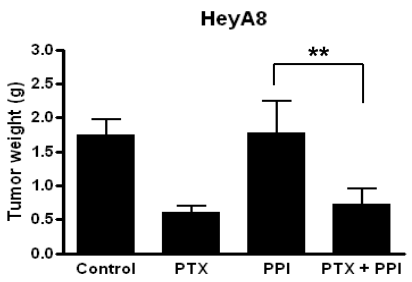
# PPI enhances the effects of cytotoxic agents in chemoresistant EOC

- **Murine Species: Female athymic nude mice, 10 mice /group**

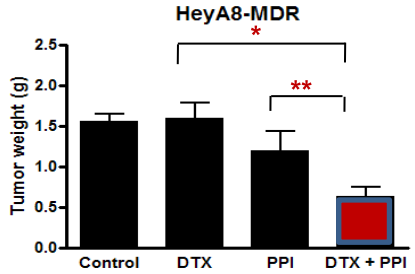



**Drug-sensitive: HeyA8**

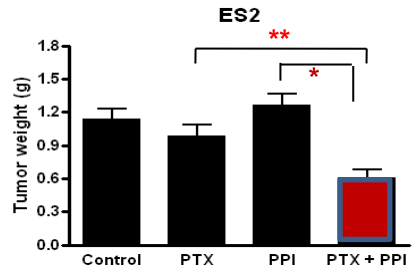
**Tumor weight**




**Drug-resistant: HeyA8-MDR**




**Clear cell type: ES2**

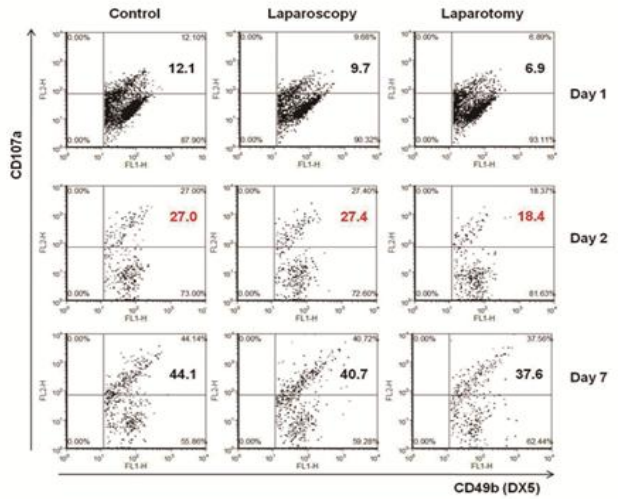


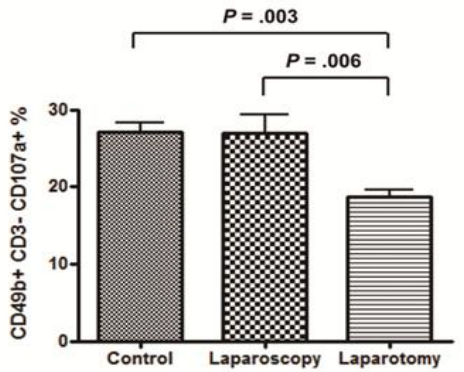

*Yoo-Young Lee … Byoung-Gie Kim, Jeong-Won Lee, Oncotarget 2015*

# *In Vivo* Drug Efficacy Evaluation (5): Syngeneic

**Mouse syngeneic tumor models :**

Some targeted therapies act by helping the immune system to destroy cancer cells. The lack of T cell function in the immune-deficient mouse xenograft models makes it impractical for testing such therapeutics..




Activated NK cell population at day 2

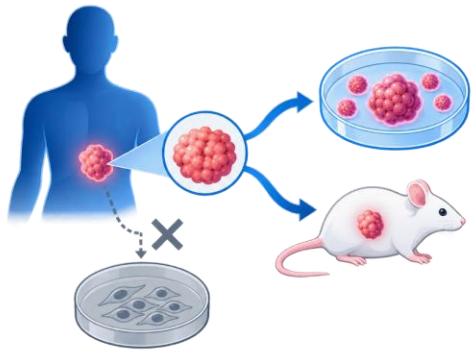
- NK cell activity using FACS analysis
- ***C57BL/6 mice*** *&* ***ID8*** *mouse ovarian cancer cells.*



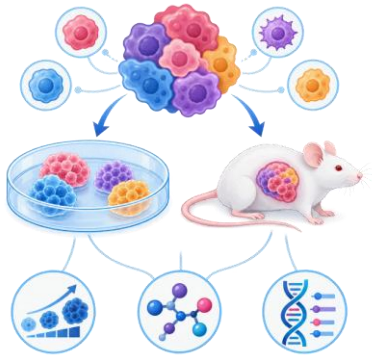
*JW Lee et al. Anticancer Res. 2013*

# PDX & PDO

**Patient-derived models of cancer**, such as xenografts (PDXs) and organoids (PDOs), have been developed aiming to address the limitations of the conventional models.



Both PDO and PDX capture the clinical heterogeneity of cancer in terms of stage, molecular features, and genetic background.



Indeed, both PDO and PDX were found to preserve the genetic mutations of the original tumor, and initial drug sensitivity tests on both models have demonstrated their abilities to faithfully recapitulate the patient-specific responses to various drugs

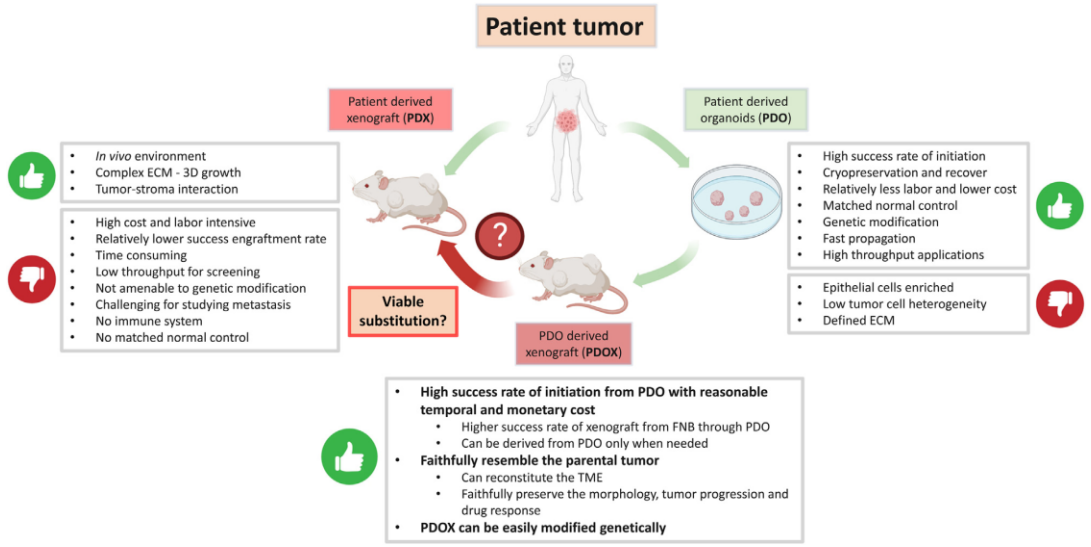


Therefore, PDO and PDX are becoming the gold standards in pre-clinical therapeutic development

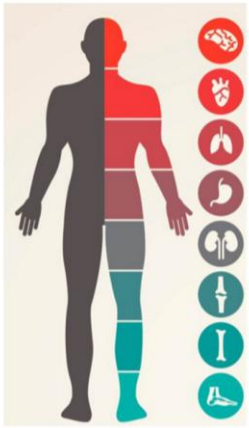


# Comparison of preclinical models for cancer

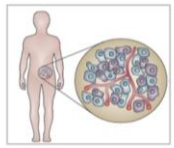
| Model | Cell line | PDX | PDO |
|---|---|---|---|
| Time consumption | + | +++ | + |
| Cost | + | +++ | ++ |
| Sample acquisition | + | +++ | ++ |
| Success rate | +++ | + | +++ |
| Matched normal tissue | - | - | +++ |
| Genetic modification | +++ | - | +++ |
| Genetic background retention | - | +++ | +++ |
| Tumor heterogeneity | - | ++ | + |
| Drug efficacy prediction | - | ++ | ++ |
| TME interaction research | - | + | +* |
| Immunotherapy evaluation | - | + | ++* |
| High-throughput drug testing | +++ | - | ++ |
| Biobanking | - | - | +++ |
| Personalized therapy | - | ++ | ++ |



# PDX models for Gyn Cancer, SMC (since Nov. 2011)
# Hospital-centered Personalized Animal Model Development



PDX = AVATAR Mouse

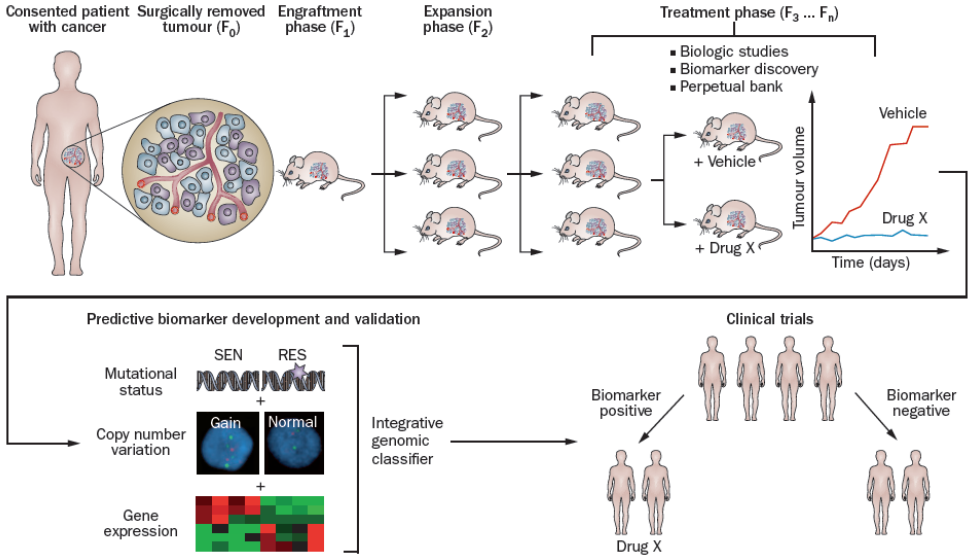




SMC | IRCR
Samsung Medical Center,
Institute for Refractory Cancer Research

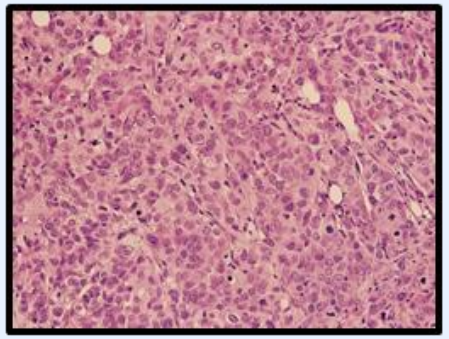
난치암 연구 사업단
난치암 치료 새로운 길을 개척하다

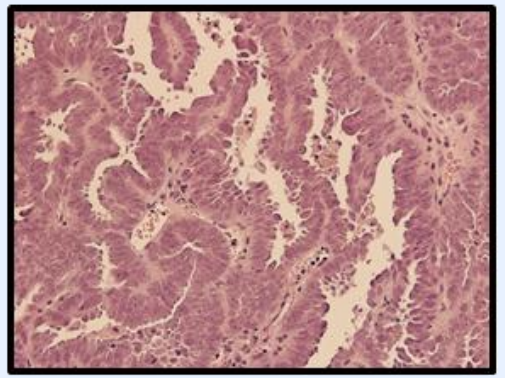
Moving Closer to Bedsides

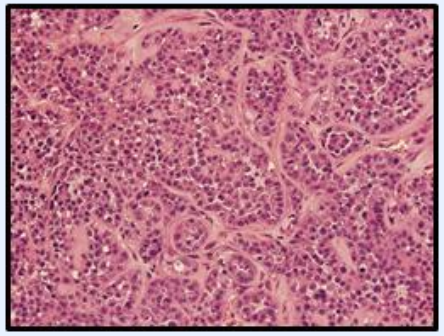


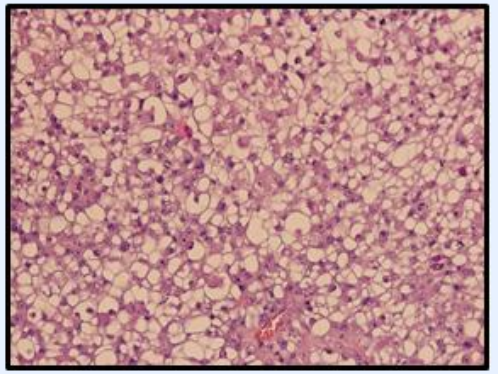

Cell-line xenografts

PDX





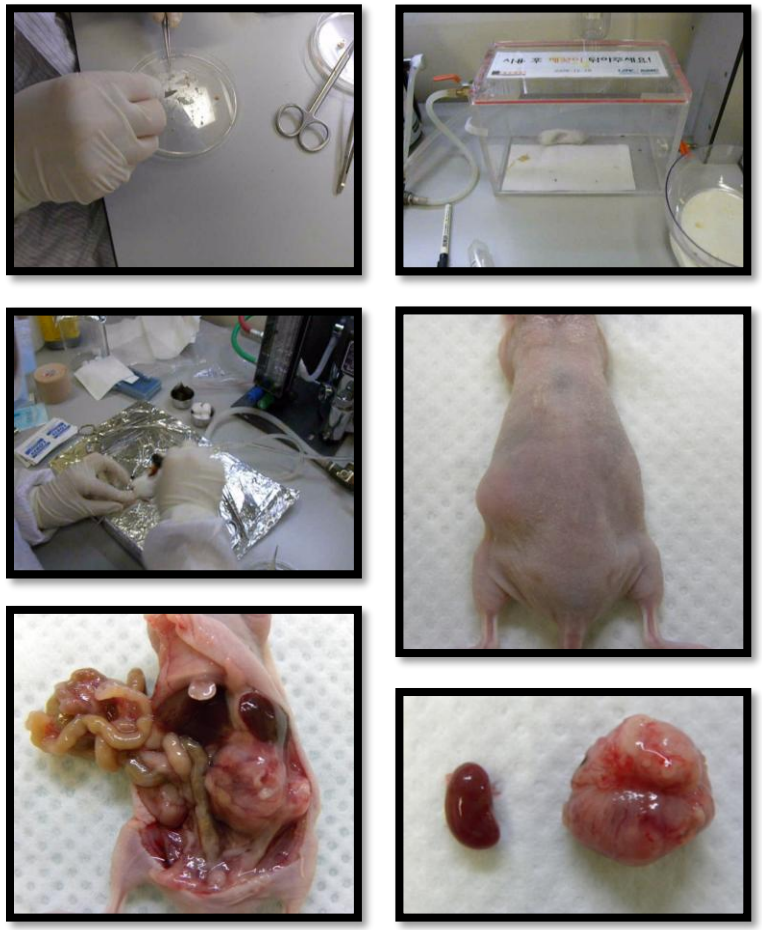




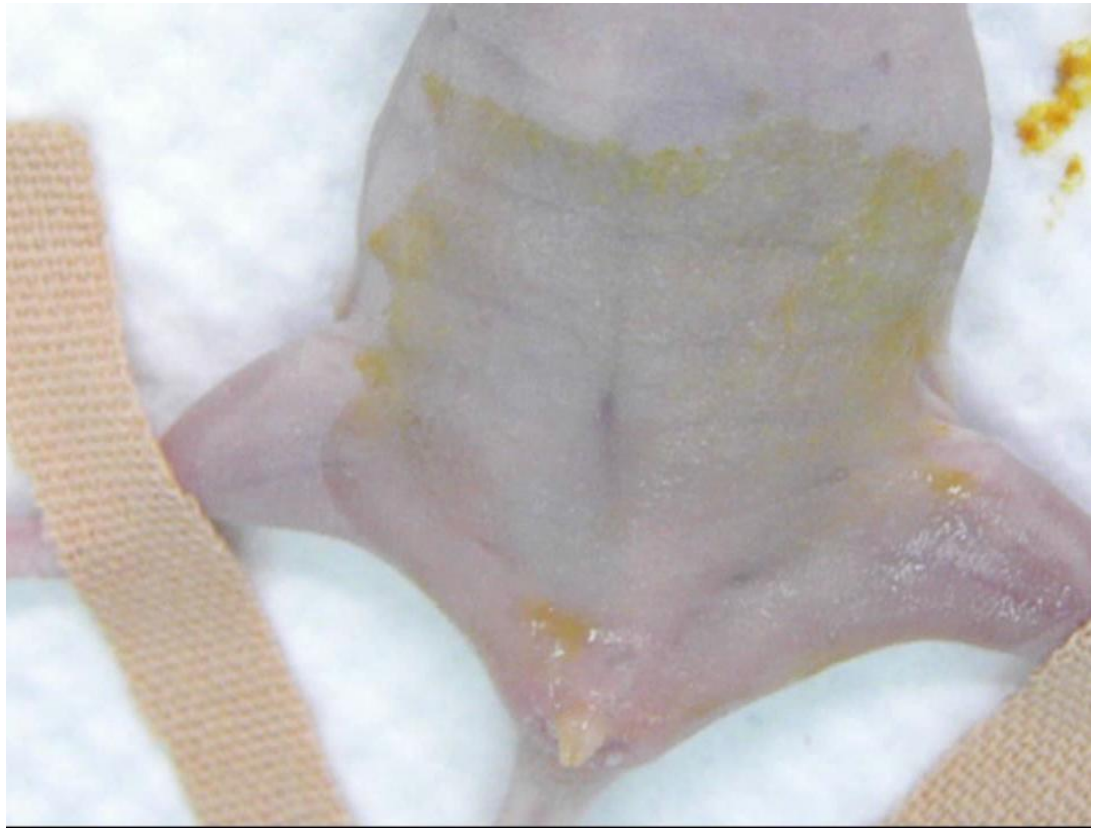
# PDX models using subrenal implantation




NOG (NOD/Shi-*scid*/IL-2Rγ$^{null}$) mouse



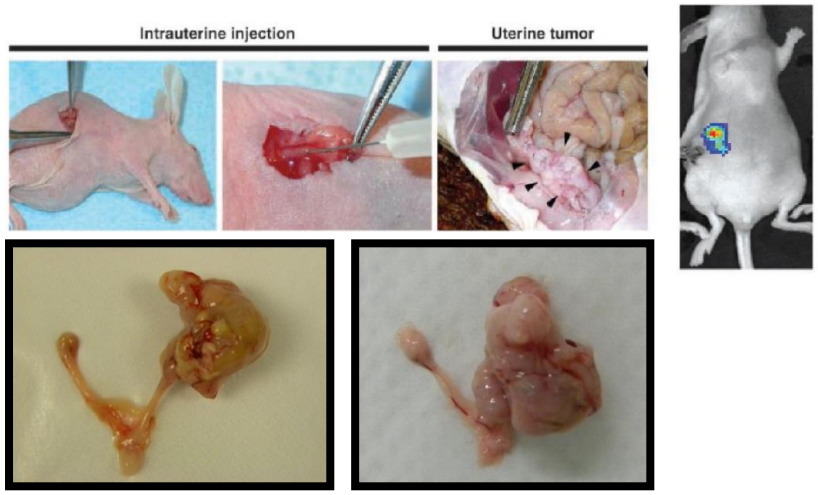
# Orthotopic uterine cancer model



*Clinical Cancer Research, 2007*

**Clinical and Biological Significance of Vascular Endothelial Growth Factor in Endometrial Cancer**

Aparna A. Kamat,[1] William M. Merritt,[1] Donna Coffey,[4] Yvonne G. Lin,[1] Pooja R. Patel,[1] Russell Broaddus,[2] Elizabeth Nugent,[1] Liz Y. Han,[1] Charles N. Landen, Jr.,[1] Whitney A. Spannuth,[1] Chunhua Lu,[1] Robert L. Coleman,[1] David M. Gershenson,[1] and Anil K. Sood[1,3]




| Total case | 18 case | |
|---|---|---|
| Methods | Subrenal | Orthotopic |
| Rate | 10/18 | 3/3 |
| Engraftment rates (%) | 55.6% | 100% |

# *In vivo* tumorigenicity rate (Jul, 2026)

**PDX model** *(2011.11.01~2026.07.31)*

| Cancer | N | PDX | | | |
|---|---|---|---|---|---|
| | | Implantation (success rate) | Ongoing | Waiting | End |
| Ovarian cancer | 379 | 159 (48.2%) | 30 | 10 | 119 |
| Uterine cancer | 187 | 78 (47.3%) | 29 | 2 | 47 |
| Cervical cancer | 108 | 43 (48.9%) | 8 | - | 35 |
| Total | 674 | 280 (48.0%) | 67 | 12 | 201 |
| | | | 79 | | |

# Papers for PDX developments of Gyn. Cancers

## *Cervical cancer*
**(Oncotarget. 2015)**

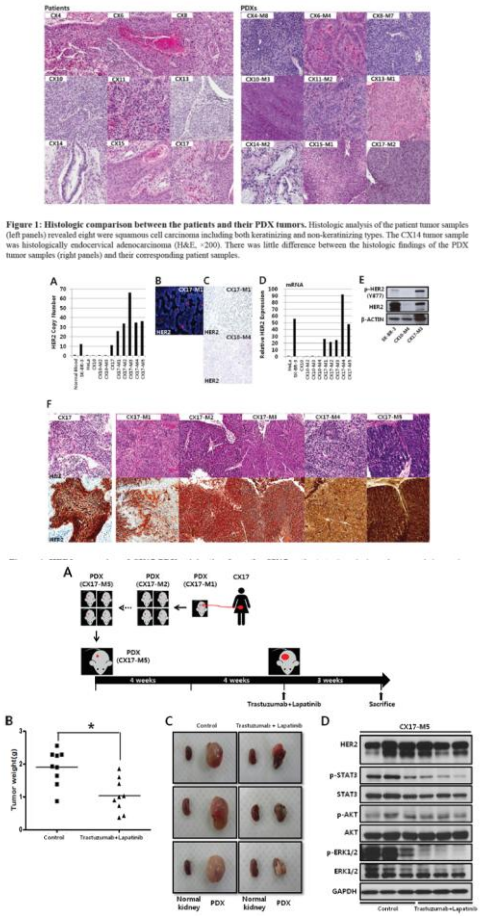
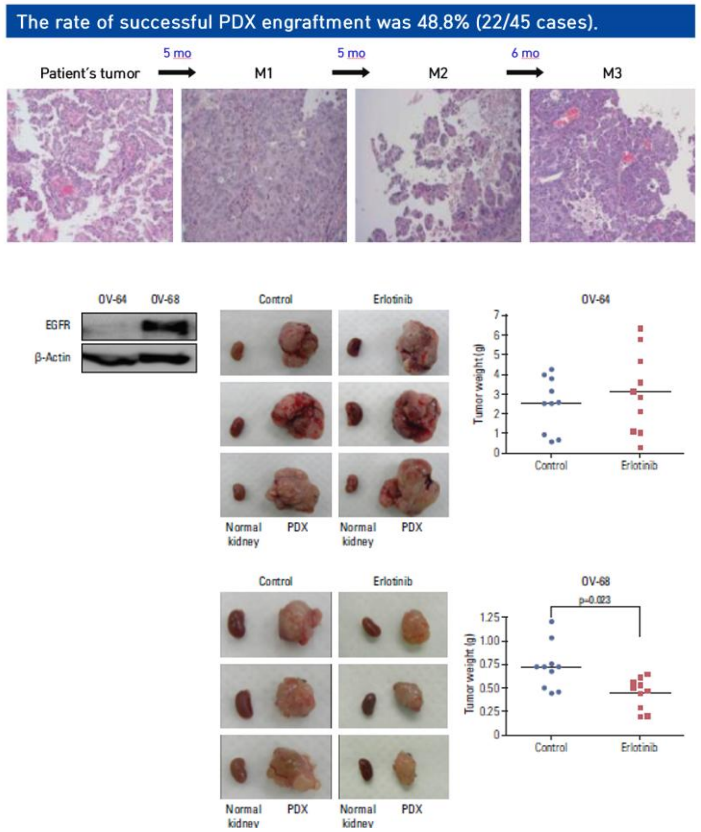
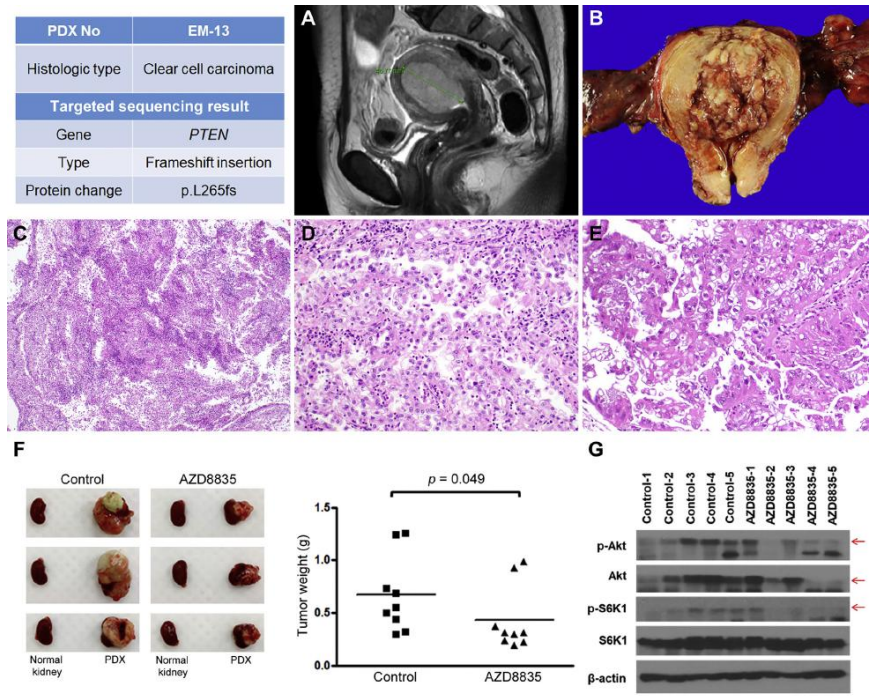


**Figure 1: Histologic comparison between the patients and their PDX tumors.** Histologic analysis of the patient tumor samples (left panels) revealed eight were squamous cell carcinoma including both keratinizing and non-keratinizing types. The CX14 tumor sample was histologically endocervical adenocarcinoma (H&E, ×200). There was little difference between the histologic findings of the PDX tumor samples (right panels) and their corresponding patient samples.

## *Ovarian cancer*
**(Cancer Res Treat, 2017)**




## *Uterine cancer*
**(Gynecologic Oncology, 2021)**

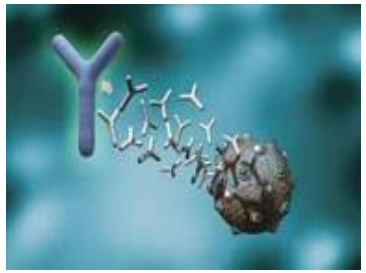


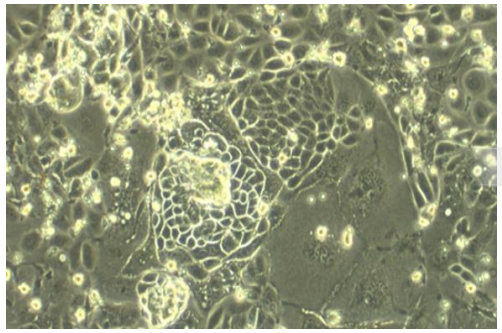
| PDX No | EM-13 |
|---|---|
| Histologic type | Clear cell carcinoma |
| **Targeted sequencing result** | |
| Gene | *PTEN* |
| Type | Frameshift insertion |
| Protein change | p.L265fs |

# Platform of Experimental Therapeutics (SMC)









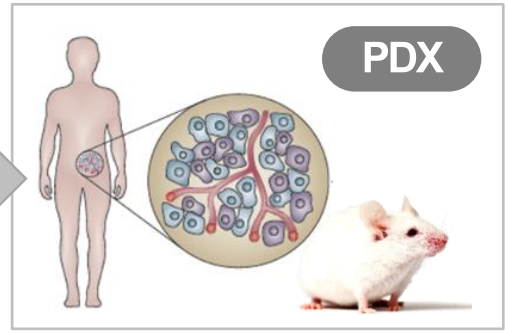
**_In vitro_**

- Survival
- Proliferation
- Apoptosis
- Invasion
- Migration
- etc



**_In vivo_** with cell lines

- Orthotopic, Heterotopic
- Drug-sensitive: HeyA8, SKOV3ip1,A2780
- Drug-resistant: HeyA8-MDR, SKOV3-TR, A2780-CP20
- Clear cell ca: RMG1, ES2




**PDX testing**

- Subrenal implant
- Histology
- Cancer type

# Our Ultimate Goal: Experimental Therapeutics

- **Moving beyond descriptive cancer biology to deliver immediate clinical solutions**

## Descriptive Cancer Biology

- **Focus on Mechanisms**
  Unraveling complex intracellular signaling pathways and genetic mapping for academic understanding.
- **Descriptive Studies**
  Observing 'why' tumors behave a certain way without necessarily offering an immediate countermeasure.
- **Long Translation Gap**
  Discoveries often take decades to move from academic journals to actual clinical practice.

## Experimental Therapeutics

- **Focus on Actionable Interventions**
  Evaluating drug efficacy, predicting chemoresistance, and validating novel therapeutic combinations.
- **Functional Precision Medicine**
  Using patient-derived systems (PDO/PDX) to directly match the right therapy to the right patient today.
- **Immediate Patient Impact**
  Translating laboratory bench assays directly back to the bedside within clinical decision-making windows.

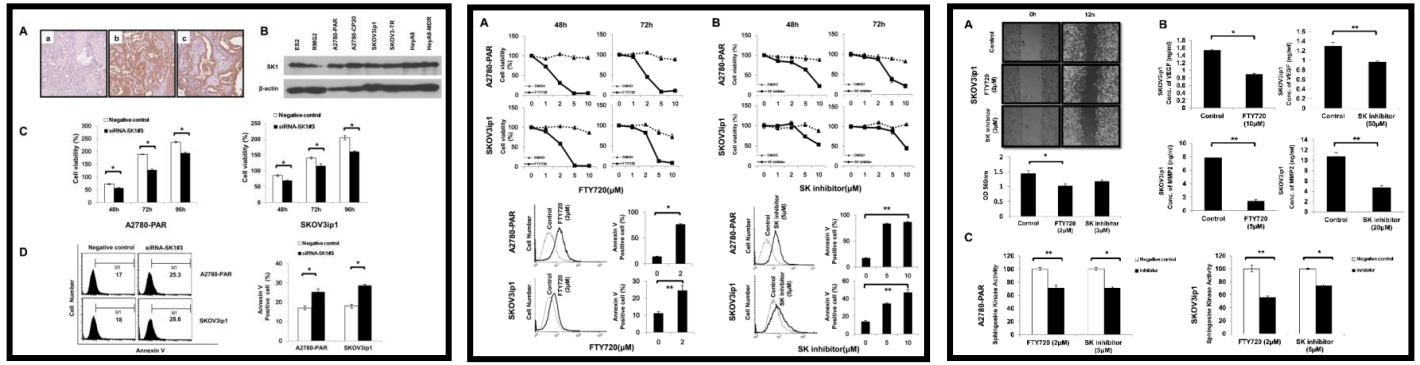
***"As GYN Oncologists, our mission is not merely to understand the biology of cancer, but to discover how to destroy it and cure our patients."***

# SK1 Inhibitor (FTY720) as Novel Target Agent in EOC

- Jeong-Won Lee et al. (Int. J Cancer 2015)

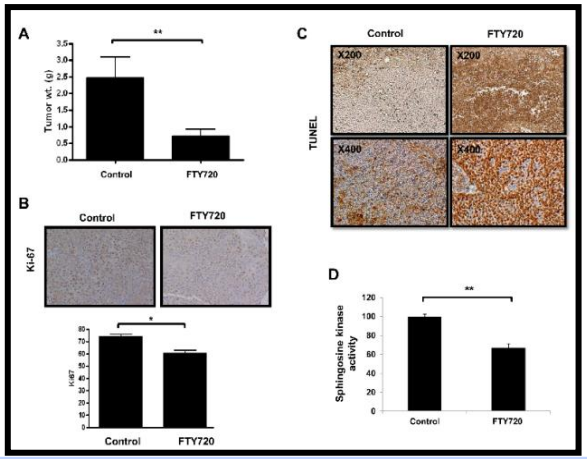
*In vitro*

**Protein expression, Survival, Proliferation, Apoptosis, Invasion, Migration, etc**

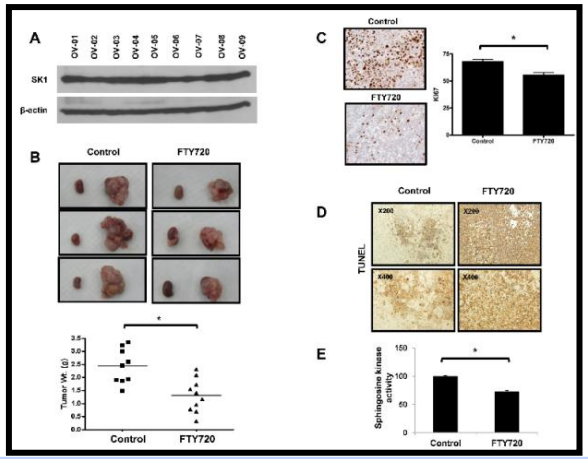


*In vivo*

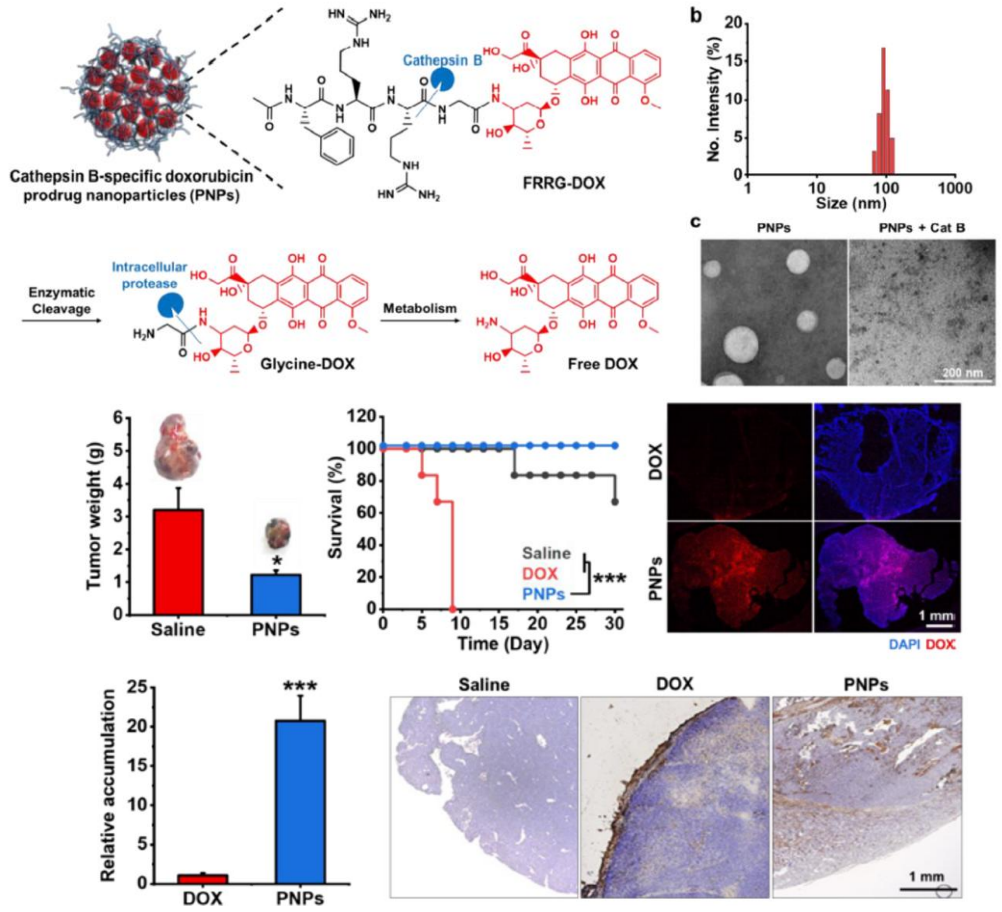
**Cell line model - orthotopic**



**PDX model - subrenal**



# SMC-KIST TRC Project
# Cathepsin B-specific doxorubicin prodrug

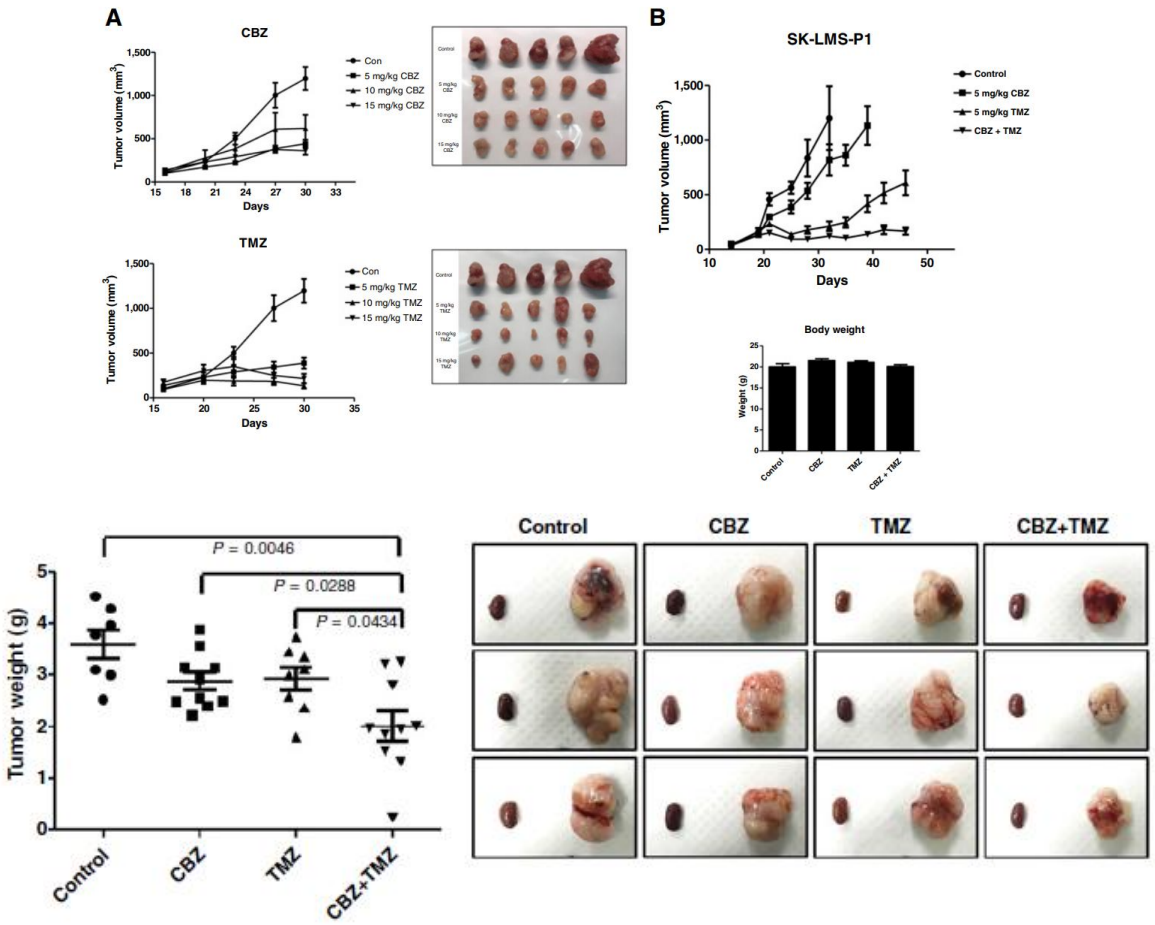



**IP chemotherapy with PNPs** efficiently inhibit tumor progression with minimal side effects in OVCA-bearing xenograft & PDX models.

These results demonstrate that PNPs effectively inhibit progression of OVCA with peritoneal carcinomatosis with minimal local and systemic toxicities by high cancer-specificity and favorable in vivo PK/PD profiles enhancing PC accumulation.

*Biomaterials. 2021*

# SMC intramural fund
# **Cabozantinib & Temozolomide in Uterine Sarcoma**




The addition of cabozantinib to temozolomide offers synergistic anticancer effects in uterine sarcoma cell lines and xenograft mouse models, including PDX.

# Drug Repurposing: Itraconazole in Ovarian Cancer

- **A Synergistic Approach: Targeting Angiogenesis, Hedgehog, and mTOR Pathways**

## Methodology

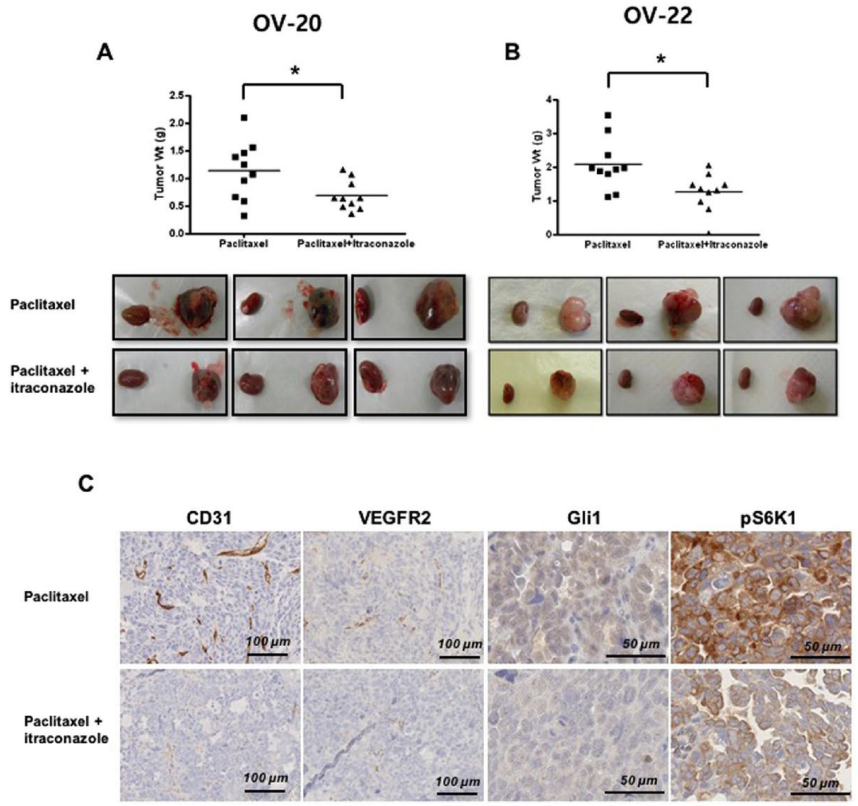
- **In vitro:** Evaluated anti-proliferative effects on EOC cells (SKOV3ip1) and endothelial cell lines (HUVEC & SVEC4-10).
- **In vivo:** Utilized orthotopic mouse models and **Patient-Derived Xenografts (PDX)** representing chemoresistant EOC.
- **Treatment Arms:** Control vs. Paclitaxel alone vs. Itraconazole alone vs. Combination Therapy.

## Key Findings

**Mechanism** Anti-angiogenic activity by downregulating **VEGFR2, Hedgehog (Gli1), and mTOR** pathways.

**Synergy** Combination of Itraconazole and Paclitaxel significantly decreased tumor weight compared to monotherapies.

**Validation** Reduced microvessel density and tumor growth were successfully confirmed in advanced PDX models.

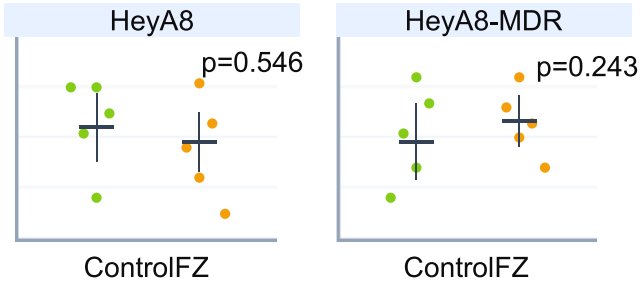


# Drug Repurposing: Fenbendazole in Ovarian Cancer

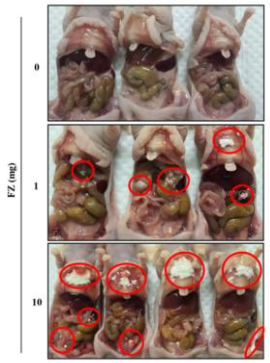
- **Overcoming *In Vivo* Limitations via Nanoparticle Delivery System**

## 1. *In Vivo* Failure

- **Oral Dosing: No Tumor Reduction**




- **IP Administration: Aggregation**



## 2. NP Innovation

**Natural Fenbendazole (FZ)**

Highly hydrophobic
Poor bioavailability

↓

**PLGA Encapsulation**

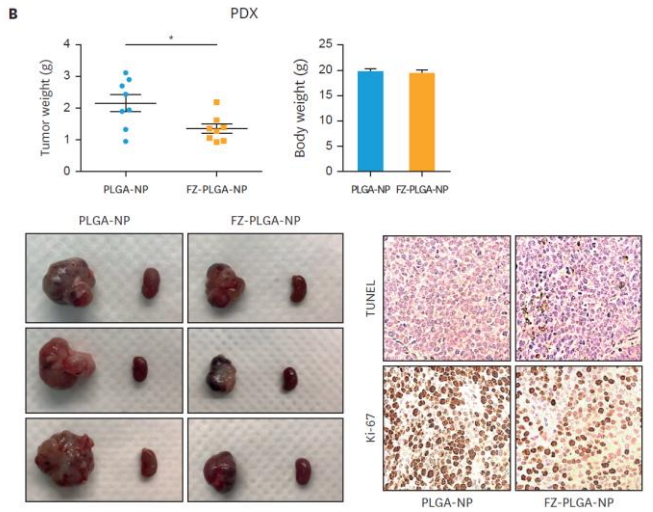
FDA-approved polymer carrier
Enhances water solubility

↓

**FZ-PLGA-NPs**

Improved cellular uptake
Targeted delivery to EOC

## 3. *In Vivo* Efficacy




**PDX Model Breakthrough**

Unlike natural FZ, FZ-PLGA-NPs successfully inhibited tumor growth in PDX models by modulating the PI3K/mTOR pathway.

*J Gyneol Oncol. 2023 Sep;34(5):e58.*

# PDO



One of the major bottlenecks in advancing basic cancer research and developing novel cancer therapies is the **lack of *in vitro* pre-clinical models** that faithfully recapitulate tumor properties in the patients.



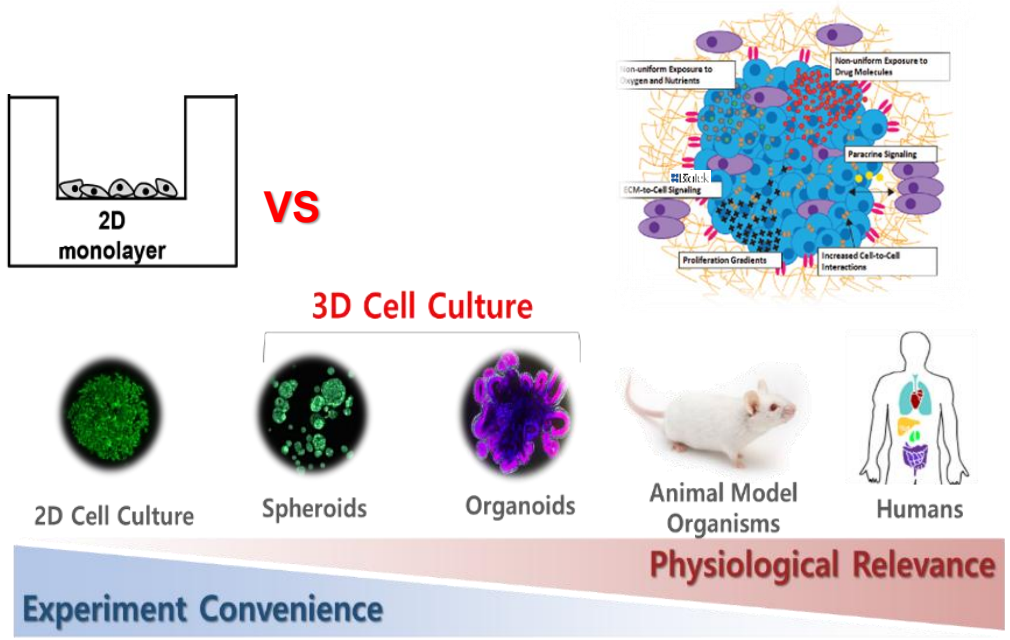
Monolayer cultures of cancer cell lines usually lose the heterogeneity of the parental tumors, while patient-derived xenograft (PDX) suffers from its time- and resource-intensive nature.



The emergence of **organoid culture system** and its application in cancer research provides a **unique opportunity to develop novel *in vitro* cancer pre-clinical models.**

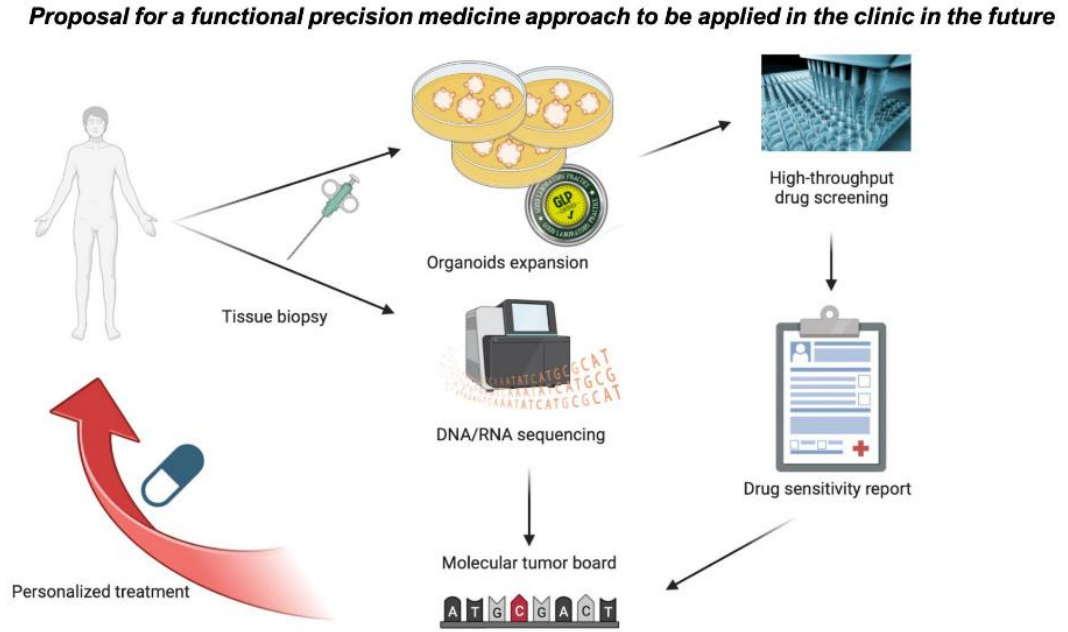
# Patient-derived organoid (PDO)

## Cancer Organoids to recapitulate *in vivo* tumors




*British Journal of Cancer 123 (2020)*

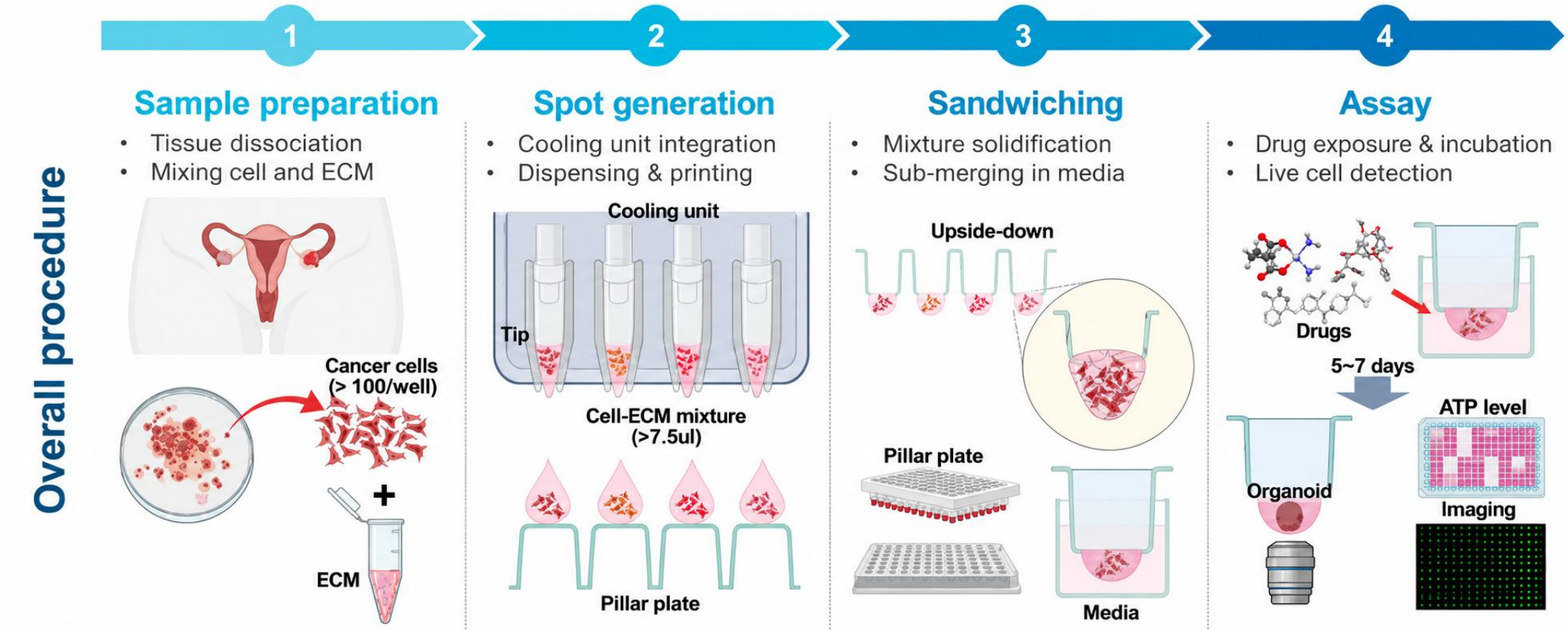
## Organoid drug screens for precision oncology




*J. Pers. Med. 2022, 12(11)*

# High-throughput organo-on-pillar (high-TOP) system

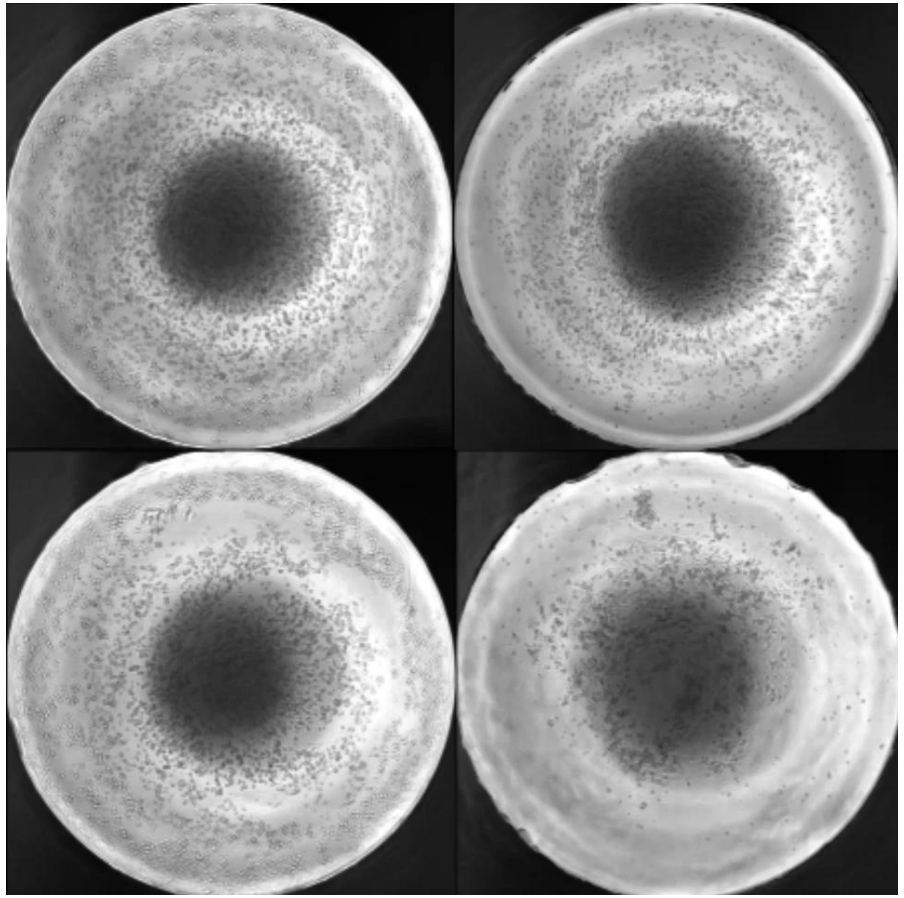
- **MBD inc.**




*Biomaterials. 2023 May;296:122087*

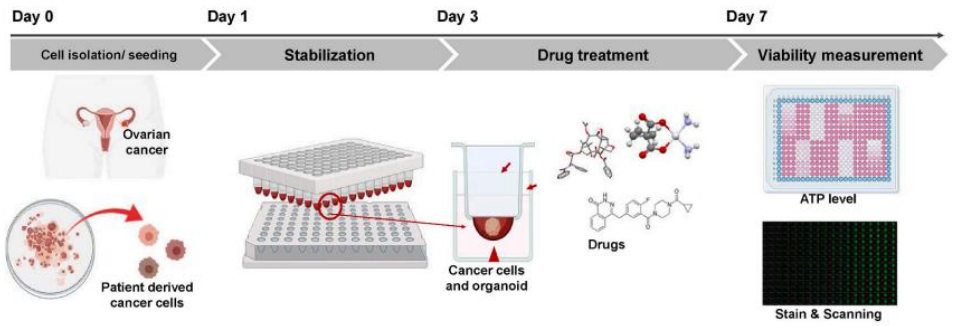
# Micropillar-based organoid dispensing platform

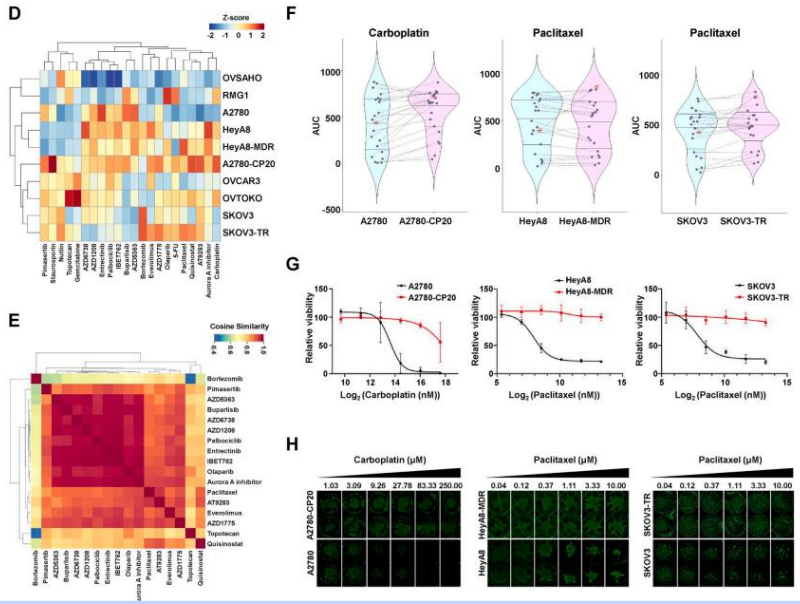


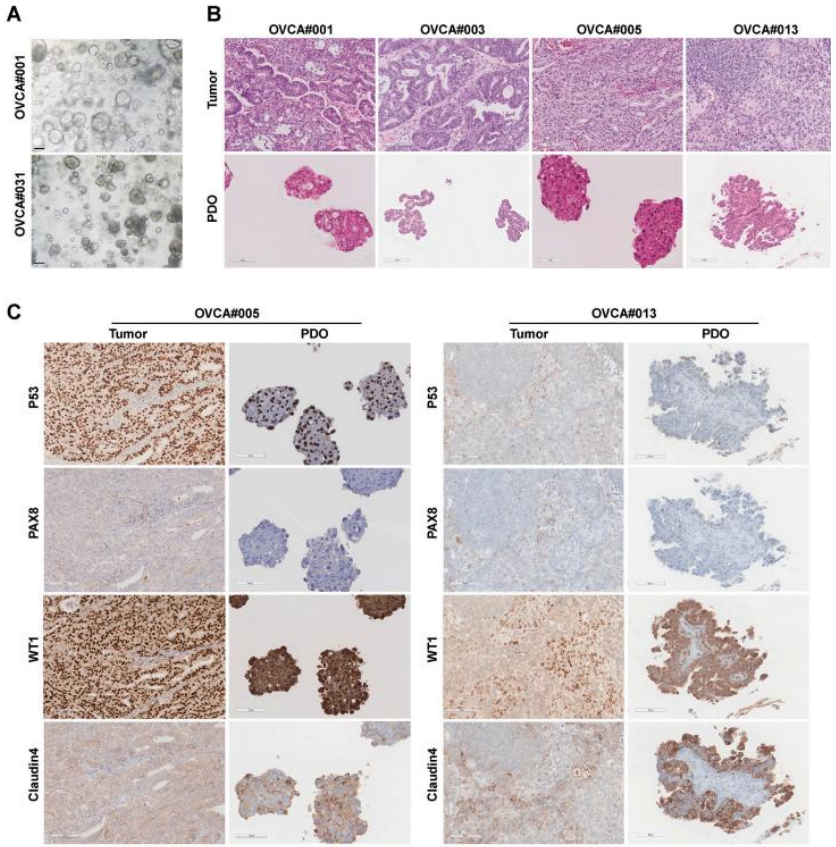


*Biomaterials. 2023 May;296:122087*

# Anticancer drug sensitivity test using PDOs for precision medicine in EOCs



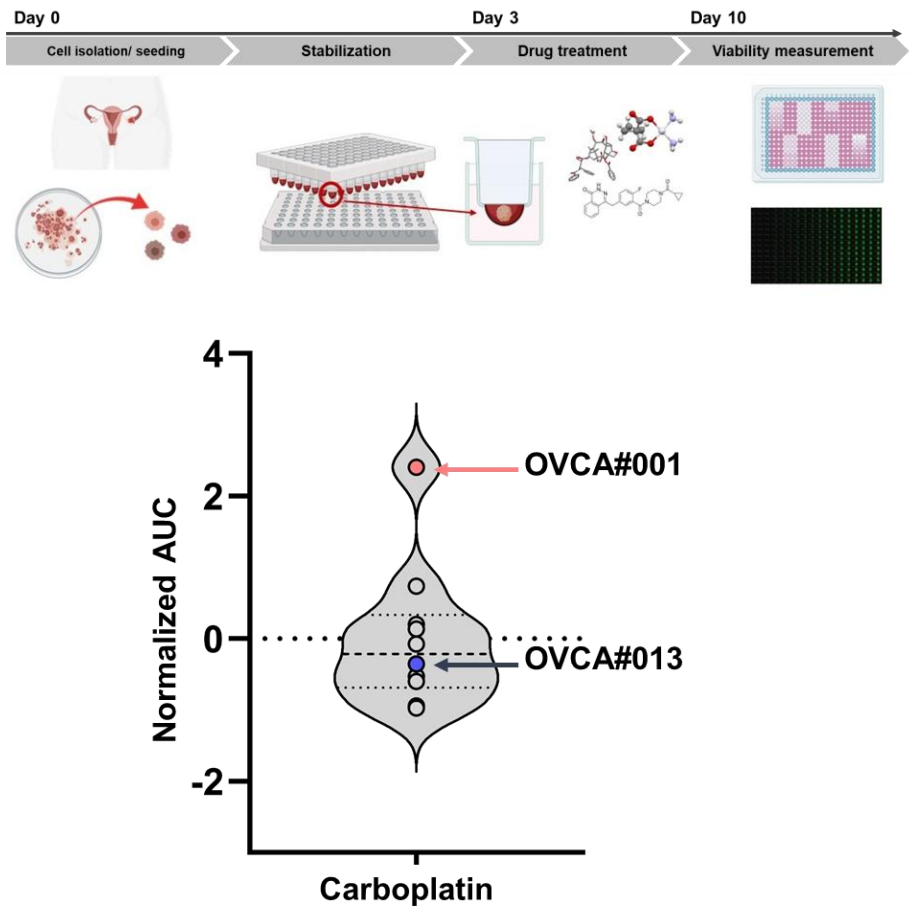



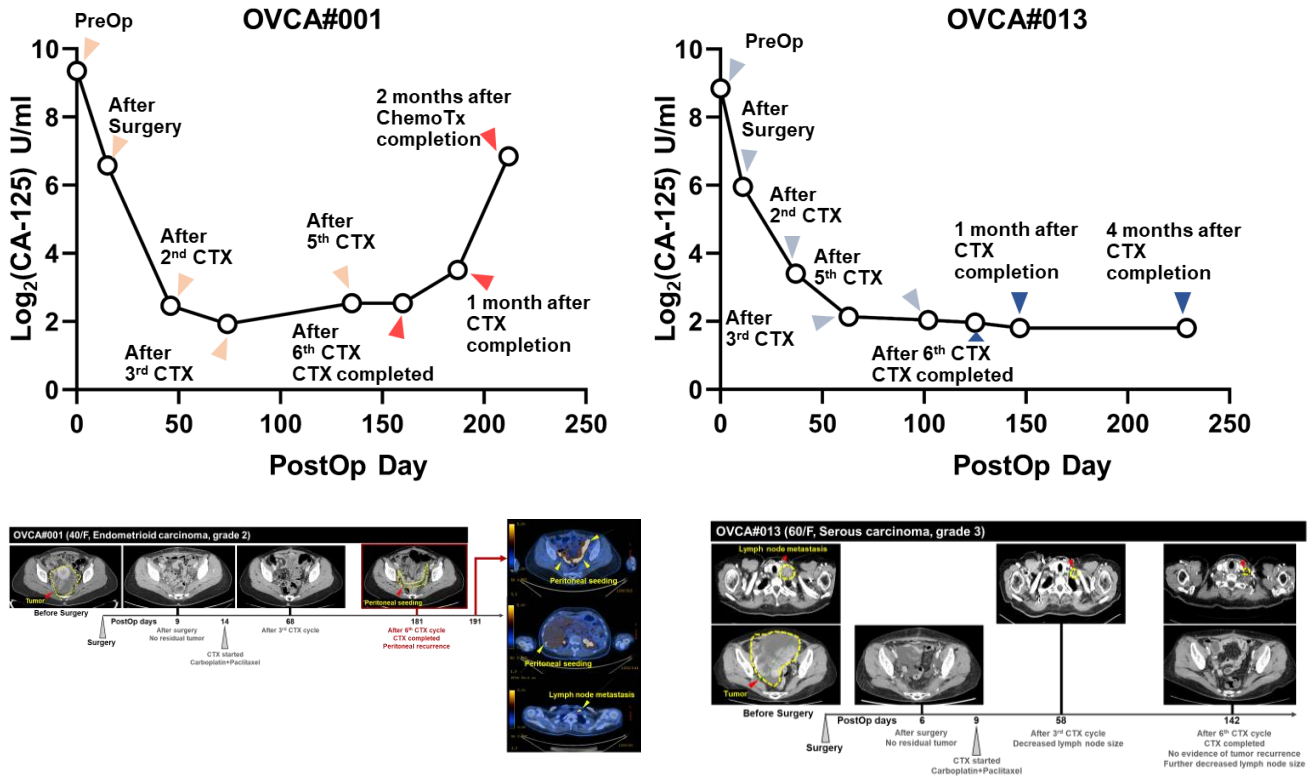
# Drug lists

| | Tested single or combination drugs |
|---|---|
| 1 | Paclitaxel (10 μM) |
| 2 | Docetaxel (100 μM) |
| 3 | Carboplatin (250 μM) |
| 4 | Bevacizumab (500 μM) |
| 5 | Paclitaxel, Carboplatin (10, 250 μM) |
| 6 | Docetaxel, Carboplatin (100, 250 μM) |
| 7 | Paclitaxel, Carboplatin, Bevacizumab (10, 250, 500 μM) |
| 8 | Docetaxel, Carboplatin, Bevacizumab (100, 250, 500 μM) |
| 9 | Gemcitabine (100 μM) |
| 10 | Topotecan (10 μM) |
| 11 | Cyclophosphamide (500 μM) |
| 12 | Doxorubicin (50 μM) |
| 13 | 5-FU (100 μM) |
| 14 | Olaparib (10 μM) |

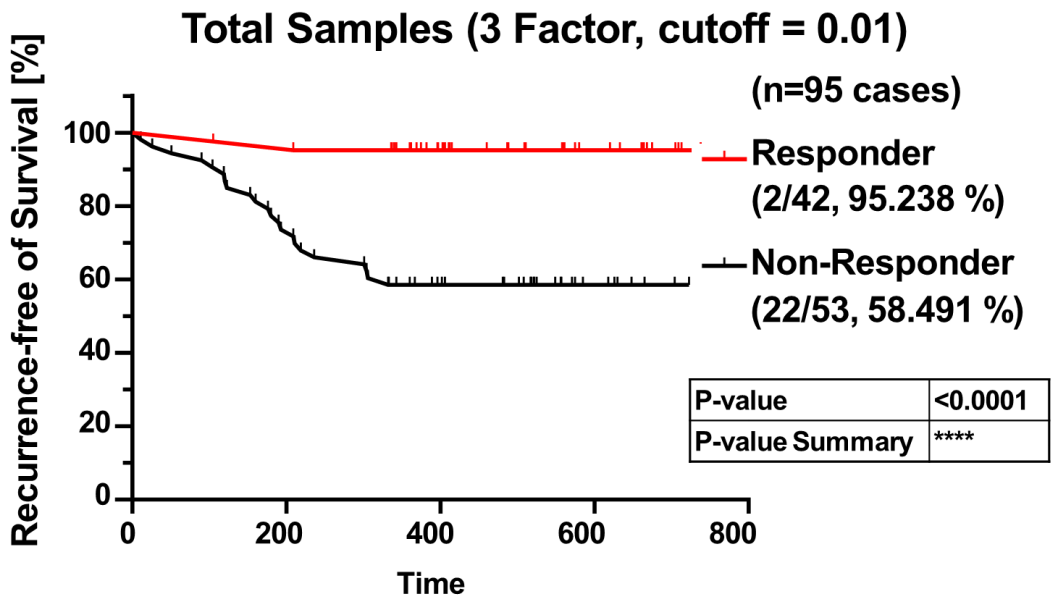
| Drug | Target |
|---|---|
| Olaparib | PARP |
| Bortezomib | Proteasome |
| Quisinostat | HDAC |
| Buparlisib | PI3K |
| Nutlin | MDM2 |
| Pimasertib | MEK |
| AZD5363 | Akt |
| AZD6738 | ATR |
| AZD1208 | Pim |
| Palbociclib | CDK4/6 |
| Everolimus | mTOR |
| Entrectinib (RXDX-101) | pan-TrkA/B/C, ROS1 |
| Molibresib (I-BET-762) | BRD4 |
| Aurora A Inhibitor I (TC-S 7010) | AURKA |
| AT9283 | JAK2/3 |
| AZD1775 | Wee1 |
| Pazopanib | |
| Cyclophosphamide | |

# PDO-drug sensitivity links patient response



# Drug Sensitivity Test vs 1st Year Recurrence after 1st line chemotherapy




**CODRP estimation**

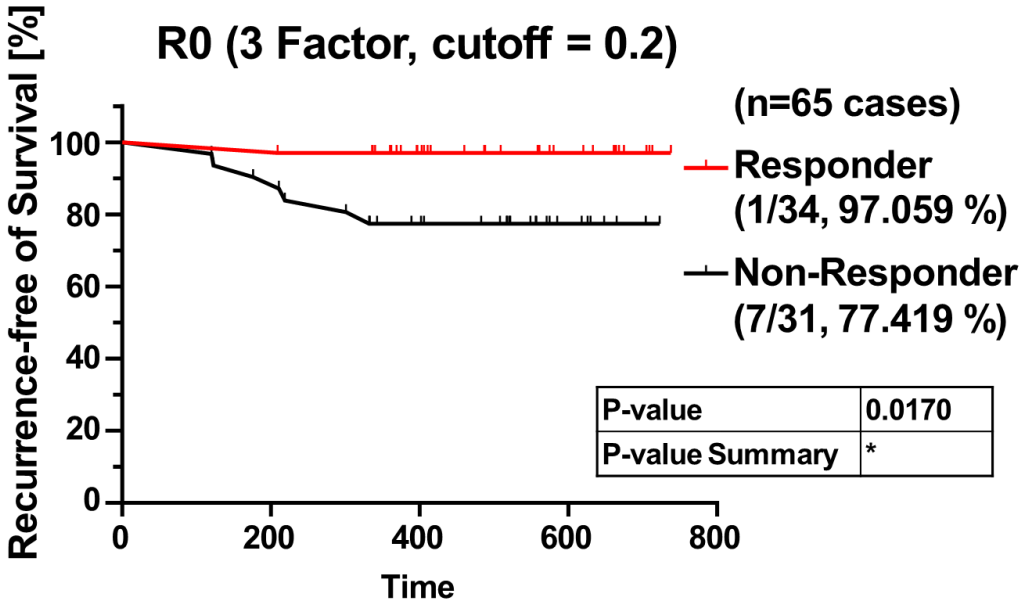
Recurrence

| Responder | Vs, | Non-responder |
|---|---|---|
| 2/42 (95.2%) | | 22/53 (58,5%) |

# recurrence-free survival rate

# Drug Sensitivity Test vs 1st Year Recurrence after 1st line chemotherapy R0

**No residual (R0), n=65**




**CODRP estimation in R0**

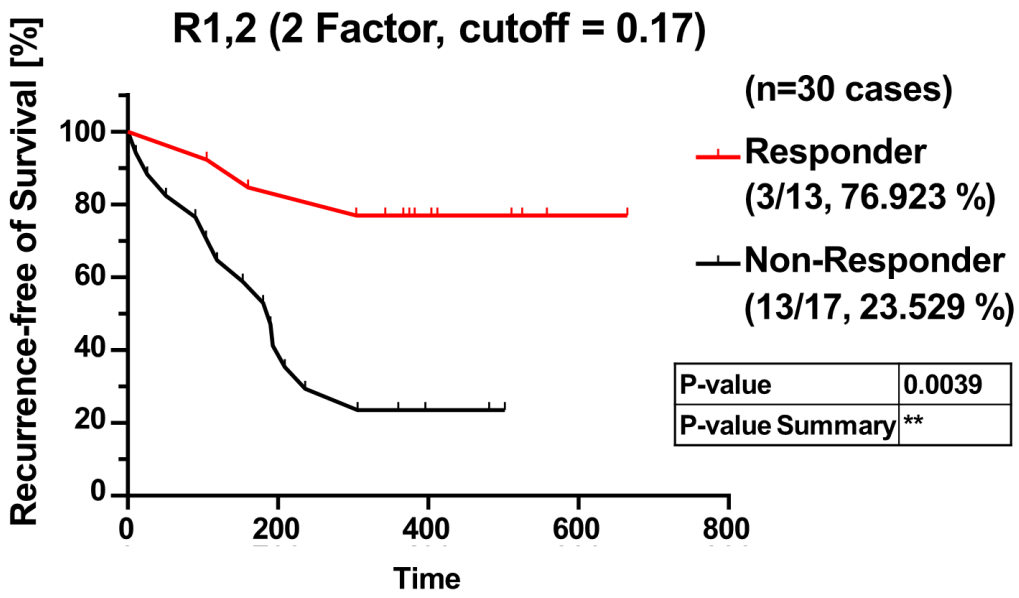
Recurrence

| Responder | Vs, | Non-responder |
|---|---|---|
| 1/34 (97.1%) | | 7/31 (77.4%) |

# recurrence-free survival rate

# Drug Sensitivity Test vs 1st Year Recurrence after 1st line chemotherapy R1 or R2

**Residual (R1. R2), n=30**




**CODRP estimation in R1-2**

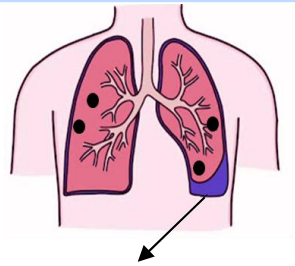
Recurrence

| Responder | Vs, | Non-responder |
|---|---|---|
| 3/13( 76.9%) | | 13/17 (23.5%) |

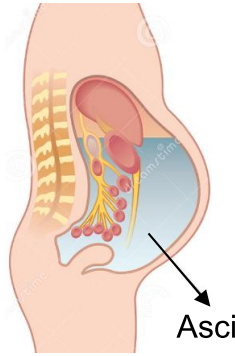
# recurrence-free survival rate

# Body Fluid-based Chemosensitivity Study

**Terminal Patients**



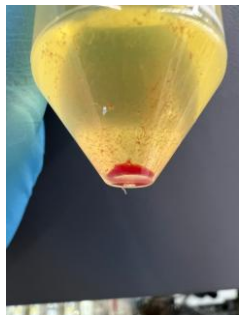
Pleural Effusion



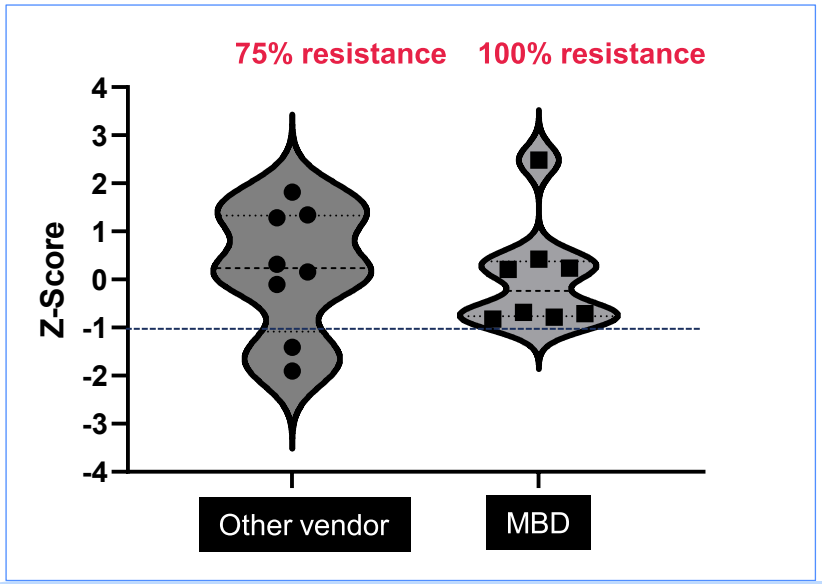
Ascites

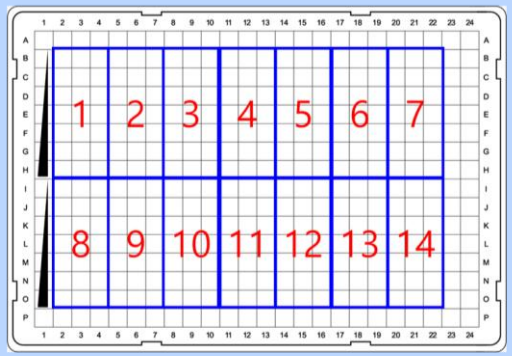


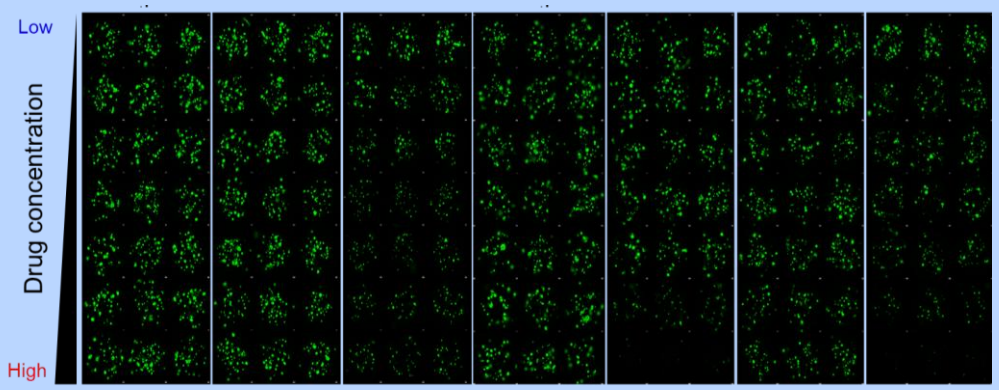
**Liquid Biopsy**



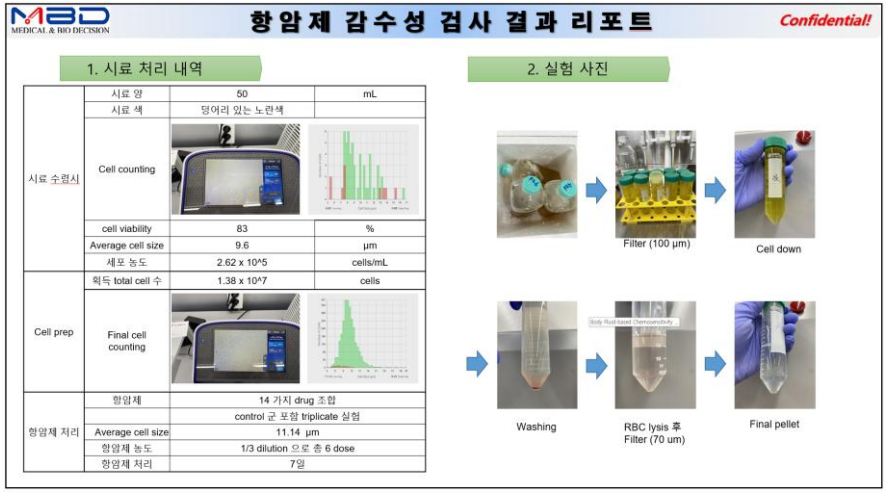
**Cancer Cells**



# Body Fluid-based Chemosensitivity Study


MBD MEDICAL & BIO DECISION

항암제 감수성 검사 결과 리포트

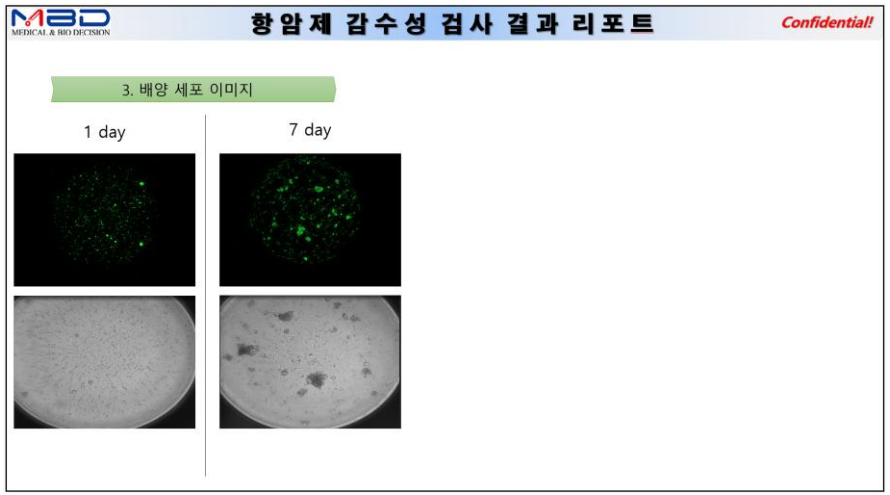
Confidential!

1. 시료 처리 내역

| | | | |
|---|---|---|---|
| 시료 수령시 | 시료 양 | 50 | mL |
| | 시료 색 | 덩어리 있는 노란색 | |
| | Cell counting | | |
| | cell viability | 83 | % |
| | Average cell size | 9.6 | μm |
| | 세포 농도 | 2.62 x 10^5 | cells/mL |
| | 획득 total cell 수 | 1.38 x 10^7 | cells |
| Cell prep | Final cell counting | | |
| 항암제 처리 | 항암제 | 14 가지 drug 조합 | |
| | | control 군 포함 triplicate 실험 | |
| | Average cell size | 11.14 μm | |
| | 항암제 농도 | 1/3 dilution 으로 총 6 dose | |
| | 항암제 처리 | 7일 | |

2. 실험 사진



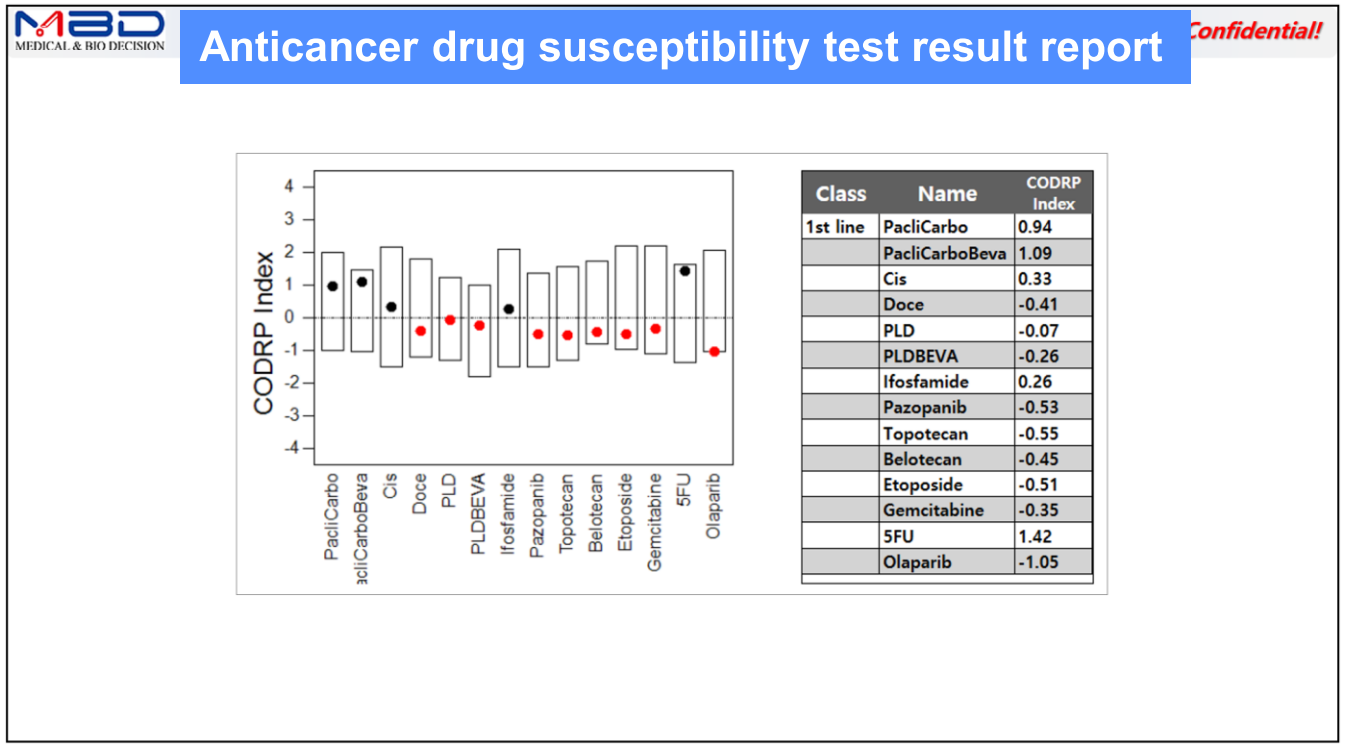

MBD MEDICAL & BIO DECISION

항암제 감수성 검사 결과 리포트

Confidential!

3. 배양 세포 이미지




MBD MEDICAL & BIO DECISION

Anticancer drug susceptibility test result report

Confidential!




| Class | Name | CODRP Index |
|---|---|---|
| 1st line | PacliCarbo | 0.94 |
| | PacliCarboBeva | 1.09 |
| | Cis | 0.33 |
| | Doce | -0.41 |
| | PLD | -0.07 |
| | PLDBEVA | -0.26 |
| | Ifosfamide | 0.26 |
| | Pazopanib | -0.53 |
| | Topotecan | -0.55 |
| | Belotecan | -0.45 |
| | Etoposide | -0.51 |
| | Gemcitabine | -0.35 |
| | 5FU | 1.42 |
| | Olaparib | -1.05 |

- **Refractory ovarian cancer pts**
  - Pleural effusion
  - Ascites

# Gynecologic Cancer Translational Research Team (SMC)

- **Experimental Therapeutics for Gynecologic Cancer**

**Mission**

01 **Bridging role** between clinical practice and basic research for gynecologic cancer

02 Find the specific **mechanisms** for unsolved gap in knowledge of clinical fields with translational research tools

03 Develop the **novel drugs** from the research bench to the patient's bedside for gynecologic cancer.

04 Perform the **clinical trials** with potential therapeutics

# Members of TR TEAM (SMC)

| | |
|---|---|
| PhD. | Jae Ryoung Hwang PhD. |
| Research manager | Jung-Joo Choi MSc |
| Research members | Young-Jae Cho MSc<br>Ji-Yoon Ryu MSc<br>Joo-Yeon Choi MSc |
| CRC | Min-Jeong Kim RN. |



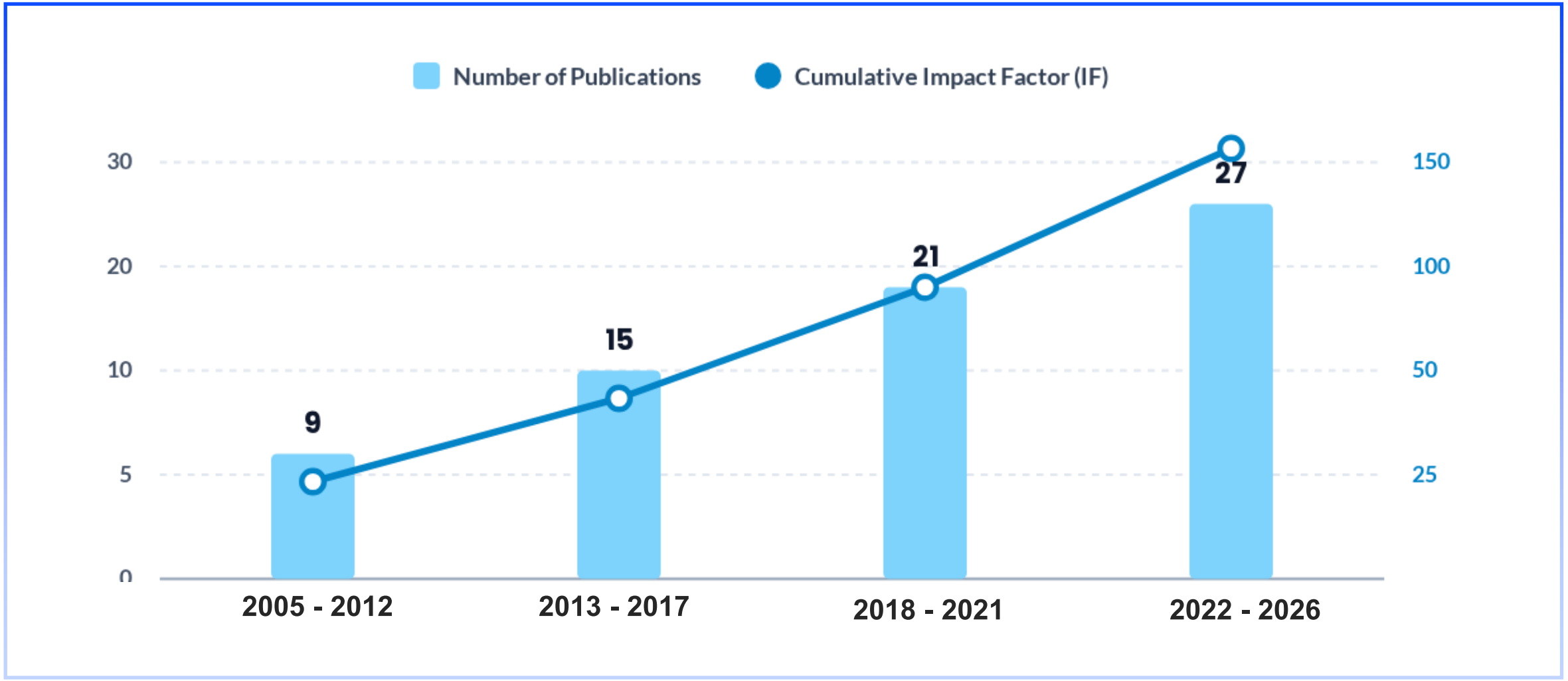



# 1. Translational Research Publication Overview (2005-2026)

- **72 Total SCI(E) Publications**

| Period | Core Focus Area | Representative Research Outputs & Keywords |
|---|---|---|
| **2005 - 2012** | **Biomarkers & Mechanisms** | Identified prognostic markers (eIF-4E, Claudin, Galectin) and mechanisms of chemoresistance in cervical and ovarian cancers. |
| **2013 - 2017** | **PDX Establishment** | Successfully developed Subrenal Avatar Mouse (PDX) models for precise in vivo evaluation of novel targeted agents. |
| **2018 - 2021** | **Drug Repositioning** | Repurposed FDA-approved drugs (Itraconazole, FTY720, Chloroquine) as potent anti-cancer agents for gynecologic malignancies. |
| **2022 - 2026** | **PDOs & Nanomedicine** | Advanced precision medicine using Organoid (PDO)-based High-Throughput Screening and novel Nanoparticle (PLGA) delivery systems. |

# 2. Publication Output & Impact Factor (IF) Trends



# 연구비 수주 총괄 현황 (2005-2026)

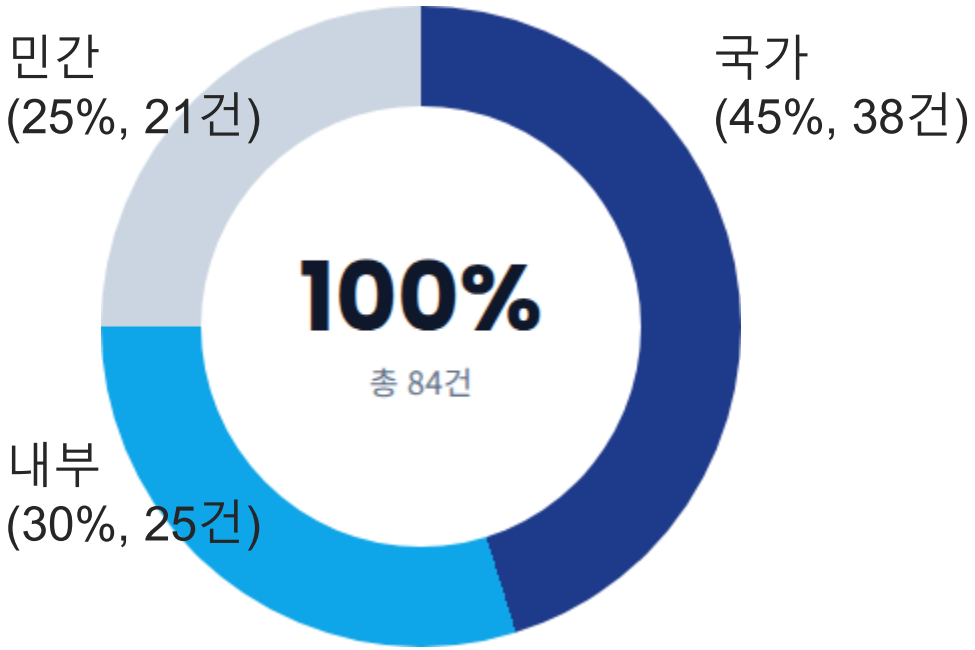
- **다변화된 펀딩 포트폴리오(국가, 내부, 민간)를 기반으로 탄탄하고 지속 가능한 중개연구 인프라 구축을 달성**

**114.7억 원**

누적 수주 연구비 총액 (약 11.47B KRW)

**84건**

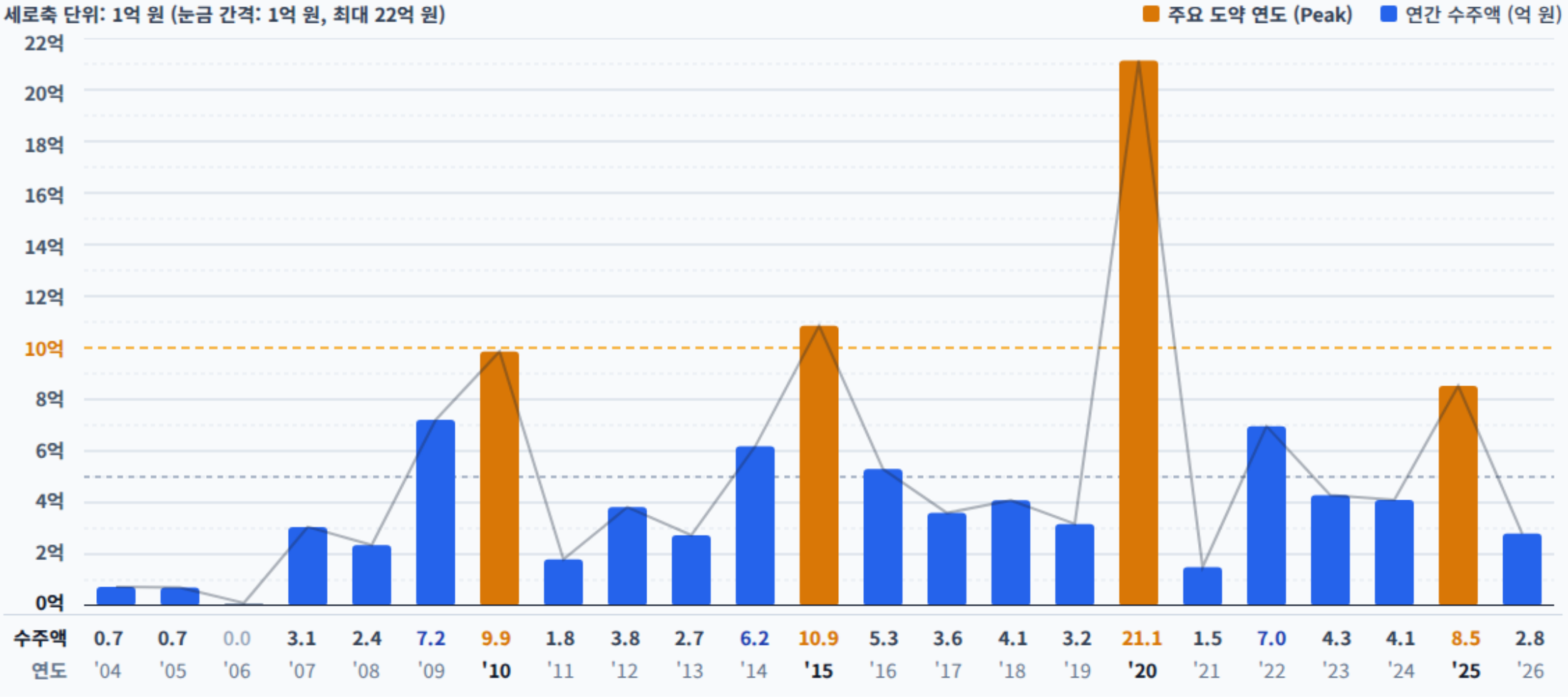
총 수행 연구 과제 수



연구과제 수주 실적 분석 (2004–2026)

# 과제 시작시점 기준 연간 수주 연구비 추이

| 총 수주 과제 | 누적 수주 총액 | 연평균 수주액 |
|---|---|---|
| 84건 | 114.8억 원 | 5.0억 원 |




**핵심 도약기: 2010년(9.9억) → 2015년(10.9억) → 2020년(21.1억, 최대) → 2025년(8.5억)**

국가 연구비 84.1억(73.3%) · 내부 19.6억(17.0%) · 민간 11.1억(9.7%)

# 3. Core Research Domain

## Drug Repositioning

- Discovering novel anti-cancer efficacy in FDA-approved non-oncology drugs.
- Overcoming chemoresistance using anthelmintics (Fenbendazole) and antifungals (Itraconazole).
- Targeting cancer metabolism and tumor microenvironment.

## Targeted Therapy

- Validating targeted inhibitors for specific oncogenic pathways (c-MET, VEGFR, HER2).
- Targeting DNA Damage Repair (DDR) and cell cycle checkpoints (PARP, Wee1, CDK7).
- Exploiting synthetic lethality in specific genetic profiles.

## Preclinical Models (PDX / PDO)

- Establishing highly reliable Avatar Mouse models via subrenal capsule implantation.
- Developing 3D Patient-Derived Organoids (PDO) for ex vivo modeling.
- Integrating NGS genomic profiling with in vivo/ex vivo validation.

## Nanomedicine & DDS

- Enhancing in vivo bioavailability of highly hydrophobic agents via nano-encapsulation.
- Developing tumor-targeted Drug Delivery Systems (DDS).
- Engineering PLGA nanoparticles and Cathepsin B-specific prodrugs.

# 4. Focus Areas: PDX Models & Drug Repositioning

## PDX / PDO Models (25+ papers)

- **Platform:** Subrenal implantation method preserving original tumor heterogeneity and microenvironment.
- **Cancer Types**: Ovarian (HGSOC, Clear Cell), Cervical, Endometrial, and Uterine Sarcoma.
- **Application**: Preclinical drug efficacy validation and High-Throughput Screening (HTS).

Avatar Mouse | Subrenal Capsule | Organoid Array | Precision Oncology

## Drug Repositioning (15+ papers)

- **Antiparasitic / Antifungal**: Fenbendazole, Itraconazole (Anti-angiogenesis & Tubulin inhibition).
- **Metabolic & Psychiatric**: Chloroquine, Proton Pump Inhibitors (PPIs), Penfluridol.
- **Strategy**: Rapid clinical translation bypassing initial phase safety trials to overcome chemoresistance.

Drug Repurposing | Chemo-sensitization | Off-label Use | Fast-track Translation

# 한빛사(BRIC) 등재 주요 연구 논문

| Year | Title & Journal | Author |
|---|---|---|
| 2023 | High-throughput organo-on-pillar (high-TOP) array system for three-dimensional ex vivo drug testing. **Biomaterials** | 전혜령 외 |
| 2022 | Anticancer Activity of the Combination of Cabozantinib and Temozolomide in Uterine Sarcoma. **Clin. Cancer Res.** | 노준호, 이정원 |
| 2021 | The safe and effective intraperitoneal chemotherapy with cathepsin B-specific doxorubicin prodrug. **Biomaterials** | 김진성 외 |
| 2019 | Pharmacogenomic analysis of patient-derived tumor cells in gynecologic cancers. **Genome Biol.** | 사경하 외 |
| 2016 | Linalool-Incorporated Nanoparticles as a Novel Anticancer Agent for Epithelial Ovarian Carcinoma. **Mol. Cancer Ther.** | 한희동 외 |
| 2012 | Splicing variant of AIMP2 as an effective target against chemoresistant ovarian cancer. **J. Mol. Cell Biol.** | 최진우 외 |
| 2009 | Surgical Stress Promotes Tumor Growth in Ovarian Carcinoma. **Clin. Cancer Res.** | 이정원 |
| 2009 | EphA2 Immunoconjugate as Molecularly Targeted Chemotherapy for Ovarian Carcinoma. **JNCI** | 이정원 |
| 2008 | Altered MicroRNA Expression in Cervical Carcinomas. **Clin. Cancer Res.** | 이정원 외 |

# SMC 중개연구팀 부인종양학회(KSGO) 수상 이력

| 연도 | 학술대회 | 수상 내역 | 수상자 (소속) | 논문명 |
|---|---|---|---|---|
| 2006 | 제21차 춘계학술대회 | 우수논문상(포스터) | 이정원 I 성균관의대 | Promoter Hypermethylation and Loss of Heterozygosity of VHL, RAR-β, RASSF1A, and FHIT Tumor Suppressor Genes on Chromosome 3p in Uterine Cervical Squamous Cell Carcinoma |
| 2012 | 제27차 춘계학술대회 | 최우수논문상 | 이정원 I 성균관의대 | Effect of Proton Pump Inhibitor on Resistance to Cytotoxic Drugs in Epithelial Ovarian Carcinoma |
| 2015 | 제30차 춘계학술대회 | 우수논문상(포스터) | 윤건 I 부산의대 | The effects of itraconazole as anti-cancer agent in epithelial ovarian cancer |
| 2016 | 제31차 춘계학술대회 | 우수논문상(포스터) | 허은진 I 성균관의대 | Development of Patient-Derived Xenograft Model for Epithelial ovarian cancer: A promising platform for translation cancer research |
| 2017 | 제32차 춘계학술대회 | 우수논문상(포스터) | 백이선 I 성균관의대 | Anticancer effect of the inhibitor of lysyl-tRNA synthase-laminin receptor in epithelial ovarian cancer |
| 2018 | 제33차 춘계학술대회 | 우수논문상(포스터) | 황재령 I 성균관의대 | Anti-tumor effects of Tetraarsenic oxide (TAO, As4O6) in human cervical cancer |
| 2020 | 제35차 춘계학술대회 | 신풍호월학술상(구연 부문) | 김지혜 I 단국의대 | Nation-wide analysis of clinical somatic NGS panel for epithelial ovarian cancer patient (KGOG 3047 study) |
| 2021 | 제27차 추계심포지엄 | 학술대상 | 이정원 I 성균관의대 | - |
| 2024 | 제39차 춘계학술대회 | 신풍호월학술상(우수포스터) | 이정원 I 성균관의대 | Anti-cancer effect of benzimidazole derivative BNZ-111 on paclitaxel-resistant ovarian cancer |
| 2026 | 제41차 춘계학술대회 | 신풍호월학술상(최우수구연) | 서준형 I 성균관의대 | Dynamics of HER2 status in recurrent cervical cancer: Highlighting the clinical necessity of re-biopsy |

# SMC 부인암 중개연구팀 학위 논문 (1/2)

| 연도 | 성명 | 학위과정 | 대학 | 논문명 |
|---|---|---|---|---|
| 2005.2 | 이정원 | 석사 | 성균관 | Increased expression of matriptase during progression of cervical neoplasia |
| 2007.2 | 서 * 성 | 석사 | 성균관 | Increased toll-like receptor 9 expression in cervical neoplasia |
| 2009.8 | 이 * 수 | **박사** | 성균관 | Clinical significance of eIF4E/mTOR expression in endometrial cancer |
| 2010.8 | 이정원 | **박사** | 고려대 | The Role of microRNAs as therapeutic target in human endometrial cancer |
| 2011.2 | 김 * 중 | 석사 | 성균관 | High claudin-7 expression is associated with a poor response to platinum-based chemotherapy in epithelial Ovarian Carcinoma |
| 2013.2 | 이 * 영 | **박사** | 중앙대 | Effects of proton pump inhibitors on chemoresistance of epithelial ovarian cancer cells |
| 2013.8 | 박 * 애 | **박사** | 성균관 | Tumor suppressive effects of bromodomain containing protein 7 (BRD7) in epithelial ovarian carcinoma |
| 2013.8 | 김 * 정 | 석사 | 고려대 | Clinical significance of galectin-7 in epithelial ovarian cancer |
| 2014.2 | 최 * 훈 | **박사** | 고려대 | Dual targeting of angiotensin receptors(AGTR1 and AGTR2) as a new therapeutic strategy in epithelial ovarian carcinoma |
| 2015.8 | 김 * 영 | **박사** | 고려대 | Autophagy inhibitors including chloroquine and bafilomycin enhance the cytotoxicity of cisplatin on drug-resistant epithelial ovarian carcinoma |
| 2017.2 | 김 * 정 | **박사** | 성균관 | c-MET as a potential therapeutic target in ovarian clear cell carcinoma |

# SMC 부인암 중개연구팀 학위 논문 (2/2) 석사7 박사14

| 연도 | 성명 | 학위과정 | 대학 | 논문명 |
|---|---|---|---|---|
| 2017.8 | 백 * 선 | **박사** | 성균관 | Anticancer effect of the inhibitor of lysyl-tRNA synthetase-laminin receptor in epithelial ovarian cancer |
| 2019.2 | 김 * 현 | **박사** | 성균관 | Preclinical assessment of the VEGFR inhibitor axitinib as a therapeutic agent in epithelial ovarian cancer |
| 2019.8 | 김 * 선 | **박사** | 성균관 | Anti-tumor effect and its mechanism of tetraarsenic hexaoxide (TAO, AS4O) in human cervical cancer |
| 2020.2 | 김 * 혜 | 석사 | 성균관 | CDK7 is a reliable prognostic factor and novel therapeutic target in epithelial ovarian cancer |
| 2022.8 | 장 * 선 | **박사** | 성균관 | Repurposing antipsychotics of the diphenylbutylpiperidine class for treatment of epithelial ovarian cancer |
| 2022.8 | 최 * 국 | 석사 | 계명대 | Anti-cancer effect of fenbendazole incorporated PLGA nanoparticles in ovarian cancer |
| 2014.8 | 송 * 종 | **박사** | 성균관 | Effect of proton pump inhibitor on chemosensitivity of cervical cancer cells to cytotoxic agents |
| 2025.8 | 김 * 혜 | **박사** | 성균관 | Exploring the anti-cancer effects of biguanides including phenformin and metformin in epithelial ovarian cancer |
| 2026 | 서 * 형 | **박사** | 성균관 | Ketogenic diet-induced ADORA2A inhibition suppresses cervical cancer progression by activating AMPK signaling |
| 2026 | 임 * 연 | 석사 | 성균관 | cIAP inhibition by AZD5582 sensitizes cervical cancer to cisplatin via caspase-dependent activating AMPK signaling |

# Ongoing CORE RESEARCH AREAS

01

## PARPi Resistance

Identification & Overcoming Strategies

02

## ADC in Rare Cancers

Efficacy Validation (e.g., Leiomyosarcoma)

03

## Drug Repositioning

Novel Therapeutic Applications

04

## GLP-1 RA in Cancer

Oncological Implications & Mechanisms

05

## Targeted Therapies

Evaluating Novel Agents & Pathways

06

## Proteogenomic Analysis

Ovarian Cancer Profiling

PART 3 -TRANSLATION

# A Mentor's Guide

- Practical Advice on How Young GYN Oncologists Can Start

# The Fading Legacy of GYN Translational Research

- **A frank look at the golden past vs. the hard present-day reality**

## The Golden Era of TR

- Sustained Devotion: GYN oncology pioneers dedicated significant efforts to bridging the clinic and the lab.
- Conference Standards: TR papers used to dominate GYN oncology society meetings and swept academic awards.
- Ubiquitous Infrastructure: Active translational research teams were established across almost all major medical centers.

## The Modern-Day Obstacles

- Waning Interest: Overwhelmed by clinical workloads and surgery, younger GYN oncologists show decreasing interest in wet labs.
- Shrinking Infrastructure: Core translational research units are shrinking due to severe labor costs and operational burdens.
- Policy & Funding Constraints: Recent drastic reductions in national R&D budgets have made securing research grants highly competitive.

# Why Translational Research is Indispensable

- **The critical pillars that hold the future of GYN oncology together**

## Cultivating Academic Talents

- Nurturing Master/PhD Scholars: Translational research is the most robust vehicle for mentoring postgraduate students and clinical fellows.
- Fostering Scientific Minds: Engaging in TR trains young surgeons to look beyond mechanical skills and think like systematic scientists.

## Fueling Next-Gen Clinical Trials

- Preclinical Proof of Concept: Almost all groundbreaking clinical trials in GYN oncology rely heavily on solid preclinical translational studies.
- Translational Feedback Loop: TR establishes the biological rationale and safety proofing, paving the way for novel therapeutics (e.g., ADCs, combinations).

# Action Step 1: Partner with Pathologists

- **The easiest entry point for surgical oncologists to launch translational studies**

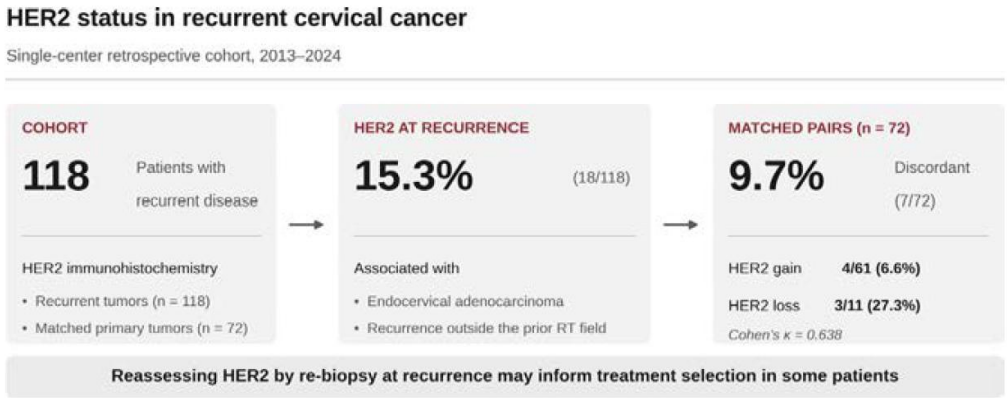
**Step 1**

## Leverage Archival and Fresh Surgical Tissues

- Befriend Pathologists: Pathologists are your ultimate allies. They safeguard clinical specimens and guide tissue-based studies.
- Simple Assay Starting Points: You do not need complex molecular assays to begin. Simple Immunohistochemistry (IHC) on archival blocks can yield valuable translational papers.
- Validate Target Expression: Focus on target receptor expression and spatial distribution in primary vs. recurrent/resistant tumors.

## Real Case: Matched Pair HER2 Dynamics

- The Study Concept: Using IHC to evaluate matched pairs of primary and recurrent GYN cancer tissues.
- Clinical Discovery: Revealing a significant HER2 discordance rate (9.7% mismatch) between primary and recurrent tumors.
- Impact: Strongly advocated for mandatory matched re-biopsy to optimize targeted therapies (ADC candidates).



# Action Steps 2 & 3: Scientific Networks & Funding

- **Leveraging collaborative synergy and translating clinical passion into grants**

**Step 2**

## Expand Your PhD Network

- Active Society Participation: Attend translational research societies (e.g., KGCR) regularly to brainstorm and get fresh ideas.
- Partner with GYN-interested PhDs: PhD scientists hold advanced methodologies (sequencing, molecular assays) but need our clinical insight and fresh tissues. Forge direct, symbiotic collaborations.

**Step 3**

## Hunt for Research Grants

- Translate Passion into Funding: Take your unaddressed bedside problems and craft novel, clinical-impact-driven proposals.
- Diversify Grant Proposals: Seek both governmental national grants and private pharmaceutical/foundation sponsorships.
- Start with Small Pilot Grants: Utilize initial seed funds to gather pilot data, which will secure larger-scale funding later.

# Overview of Korean Gynecologic Cancer Research (KGCR)

- **Established:** 2011 ~
- **KeMission:** Advancing **translational research** in gynecologic cancers
- **y Focus:** Collaboration between **basic and clinical** researchers

KGCR 대한부인암중개연구회 Korean Gynecologic Cancer Research

www.kgcr.co.kr

- **Leadership**

| | |
|---|---|
| **Past Presidents** | Kim Yong-Man (Ulsan University) / Cho Chi-Heum (Keimyung University)<br>Kim Jae-Hoon (Yonsei University) / Lee Jae-Kwan (Korea University) |
| **Immediate past President** | Lee Jeong-Won (Sungkyunkwan University) |

- **Members (> 200):** Comprises **Mds And Phds From Diverse Backgrounds** - Including Basic Scientists, clinical researchers, and interdisciplinary experts - collaborating to advance translational research in gynecologic cancers.

# Overview of Korean Gynecologic Cancer Research (KGCR)

- **Historical Milestones**

  2011, First KGCR Lab Research Meeting

  2011-15, Regular Joint Lab Seminar

  Annual Conferences & Symposiums: Spring & Fall Conferences (Since 2012)

KGCR
대한부인암중개연구회
Korean Gynecologic Cancer Research

www.kgcr.co.kr

- **Future Vision**

  - Domestic and International collaboration & networking
  - Strengthening translational research in clinical applications
  - Expanding research funding & policy advisory roles

# KGCR: Translational Research Hub

- **Bridging the Gap Between Bench and Bedside in Gynecologic Oncology**

## Overcoming Therapeutic Resistance

- **Radiation** resistance
- **Chemoresistance** (Mitochondrial ROS)
- **Ferroptosis** resistance
- Immune-Refractory tumors

## Next-Gen Therapeutics & Delivery

- **siRNA / RNAi** Nanoparticles
- Cancer-targeting **Aptamers**
- Cleavable **PDCs**
- Evolution of **Cell Therapy**

## Omics & Epigenetics

- Multiomics **Radiogenomic** analysis
- Intratumoral **Spatial Heterogeneity**
- Aberrant **Chromatin Topology**
- **Epigenetic Silencing**

## Quantum Technologies

- **Quantum Computing** for Life Science
- **Quantum Sensors**
- Molecular Assays
- Quantum Key Distribution

04

PART 4 –CLINICAL IMPACT

# Concluding Remarks & Open Q&A

# Concluding Remarks (1/2)

## ▪ Step 1. Building Your Foundation in the Hospital

### 1. Focus on Ideas, Not Just Lab Skills

As an MD, you don't need to know every experimental method. Good clinical ideas are the most important. You can solve technical issues by teaming up with PhDs.

### 2. Make Friends with Pathologists

Build a strong, friendly relationship with your pathology department. They are your best allies in accessing samples and starting translational research.

### 3. Bank Your Surgical Tissues

Whenever possible, save and bank the human tissues you acquire during surgery.
These tissues are your greatest assets for your future research plans.

# Concluding Remarks (2/2)

## ▪ Step 2. Expanding Your Network & Finding Support



### 4. Find Answers at TR Conferences

Attend translational research (TR) symposia and conferences actively.
Try to find ways to solve your unsolved clinical problems through TR.



### 5. Collaborate with Basic Scientists

Reach out to basic researchers at universities or research institutions.
Frequently share your clinical ideas with them to create powerful collaborations.



### 6. Apply for National Grants for Young Doctors

Look for government research grants designed for young clinicians.
Even with just a great clinical idea, you can easily win research funding to start your journey.

# Take-Home Message

*"We hold the scalpel, we hold the fresh tissues, and we hold the clinical keys. You are the pioneers of tomorrow's precision oncology."*

**Acknowledgements** (SMC Gynecologic Cancer TR Team & KGCR network)

Thank you for your attention

# 주요 학술 수상 내역

| DATE | AWARD & INSTITUTION | TOPIC / PAPER TITLE |
|---|---|---|
| 2010.10 | 최우수 구연상 (부인종양학)<br>대한산부인과학회 | Interaction with microRNA-200c and BRD7 in endometrial carcinoma |
| 2012.04 | 제1회 신풍호월 학술상 (최우수 논문상)<br>대한부인종양학회·신풍제약(주) | Effect of Proton Pump Inhibitor on Resistance to Cytotoxic Drugs in Epithelial Ovarian Carcinoma |
| 2014.04 | IS Award<br>Japan Society of Obstetrics and Gynecology (JSOG) | Patient-derived Tumor Xenograft Model for Gynecologic Cancer |
| 2020.02 | RESEARCH 부문 SAIHST ARROW AWARD<br>성균관대학교 삼성융합의과학원 | Pharmacogenomic analysis of patient-derived tumor cells in gynecologic cancers |
| 2020.06 | 제9회 대한암학회 광동 암학술상<br>대한암학회 | Pharmacogenomic analysis of patient-derived tumor cells in gynecologic cancers |
| 2021.10 | 부인종양의학상 (학술대상)<br>대한부인종양학회 | 부인종양학 분야 발전 기여 및 뛰어난 연구 성과 |
| 2024.04 | 신풍호월 우수학술상 (포스터 부문)<br>대한부인종양학회 | Anti-cancer effect of benzimidazole derivative BNZ-111 on paclitaxel-resistant ovarian cancer |