Apr 2022
V4.02

Peptron's Science, Technology and Business

Scientific Evaluation of Peptron's Assets

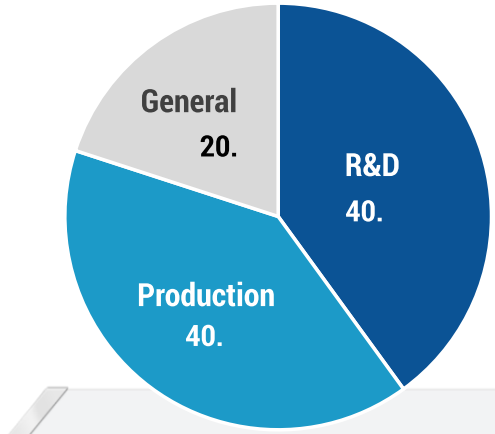
PEPTRON
|주|펩트론

LEADER OF LONG-ACTING THERAPY

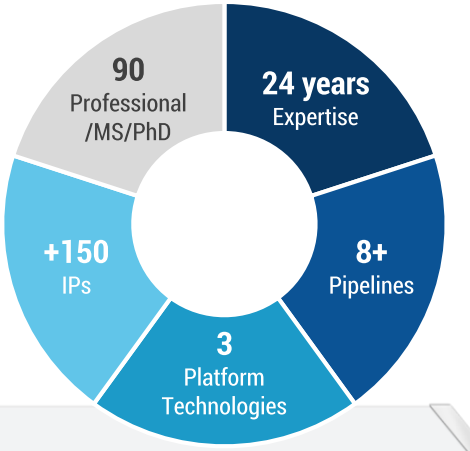
COMPANY PROFILE

COMPANY	Peptron Inc.
CEO	Dr. Ho-il Choi
INCEPTION	Nov 21. 1997
IPO	Jul 22. 2015 (KOSDAQ)
PAID-IN CAPITAL	10,313 Mn. KRW
EMPLOYEES	90+

EMPLOYEE DISTRIBUTION

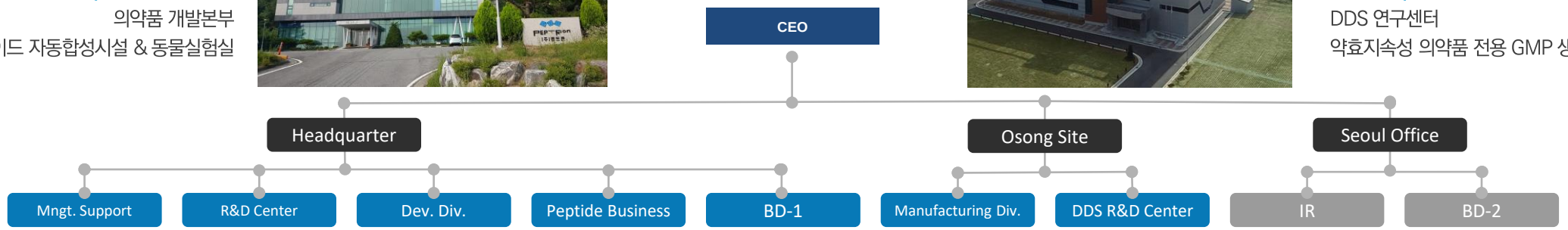


OUR CAPABILITIES



대전 본사
PeptrEX & PEPGEN
의약품 개발본부
펩타이드 자동합성시설 & 동물실험실

오송 바이오파크
SmartDepot
DDS 연구센터
약효지속성 의약품 전용 GMP 생산시설



PLATRORM TECHNOLOGY

PEPTIDE

PLATFORM TECHNOLOGY

Long-acting

Auto synth

Ab generation

SmartDepot™

Sustained Release (1 week~6 month)
GMP Facility with aseptic processing
Easy scale-UP

- 펩타이드 의약품 Hormone
- 주사제 → 지속형 (Long-Acting)
- Brain Delivery 유리

퇴행성 뇌질환

대사성 만성질환

PeptrEX®

Automatic peptide synthesis technology with multi-Parallel System
Peptide Library / screening

- 펩타이드 신약 개발

Cyclic Peptide

PDC

PEPGEN™

Antigenicity - Improved formulation
for immunostimulatory effects of membrane-anchored antigens to generate antibody

- 암세포 표면 항원 신규 타깃 항체 개발
- Unmet need / 난치성 고형암
- Application 확장성

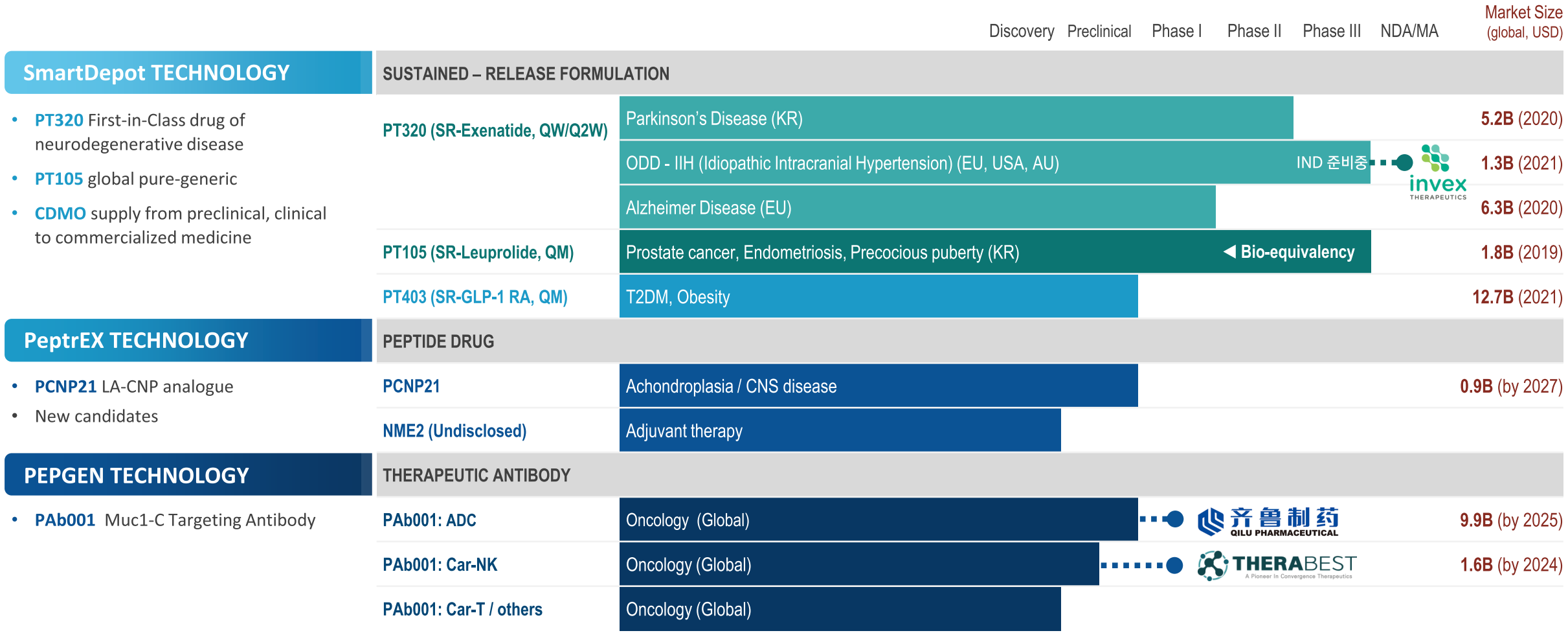
ADC

CAR

면역관문 억제제

CozyCure

PIPELINE


Discovery
Preclinical
Phase I
Phase II
Phase III
NDA/MA
Market Size (global, USD)
SmartDepot TECHNOLOGY
SUSTAINED – RELEASE FORMULATION
• PT320 First-in-Class drug of neurodegenerative disease
• PT105 global pure-generic
• CDMO supply from preclinical, clinical to commercialized medicine
PT320 (SR-Exenatide, QW/Q2W)
Parkinson's Disease (KR)
5.2B (2020)
ODD - IIH (Idiopathic Intracranial Hypertension) (EU, USA, AU)
IND 준비중
invex THERAPEUTICS
1.3B (2021)
Alzheimer Disease (EU)
6.3B (2020)
PT105 (SR-Leuprolide, QM)
Prostate cancer, Endometriosis, Precocious puberty (KR)
◀ Bio-equivalency
1.8B (2019)
PT403 (SR-GLP-1 RA, QM)
T2DM, Obesity
12.7B (2021)
PeptrEX TECHNOLOGY
PEPTIDE DRUG
• PCNP21 LA-CNP analogue
• New candidates
PCNP21
Achondroplasia / CNS disease
0.9B (by 2027)
NME2 (Undisclosed)
Adjuvant therapy
PEPGEN TECHNOLOGY
THERAPEUTIC ANTIBODY
• PAb001 Muc1-C Targeting Antibody
PAb001: ADC
Oncology (Global)
齐鲁制药 QILU PHARMACEUTICAL
9.9B (by 2025)
PAb001: Car-NK
Oncology (Global)
THERABEST A Pioneer In Convergence Therapeutics
1.6B (by 2024)
PAb001: Car-T / others
Oncology (Global)

치매/뇌질환 혁신 신약 개발

PT320
SR-Exenatide

1. **Scientific Novelty**
   GLP-1 기반 새로운 기전의 뇌질환 치료제 개발 선두
   증상완화제가 아닌 근본적 치료제: **disease-modifying effect**

2. **Enhanced Efficacy**
   Sustained Release technology (Smart Depot)
   - **Enhanced BBB-penetrating rates : GLP-1 RA 중 최고 수준**
   - Extended release profile : **1주/2주 지속형**

3. **Improved Pt. Compliance**
   Most advanced formulation by biweekly injection
   - Reduced the injection frequency
   - Less likelihood of side effects

4. **Product Supply(CMC)**
   Peptron's GMP facility
   - Quality Management System for CMC
   - Scale-Up and Running experience

GLP-1 RA (exenatide)의 신경세포 보호 / 치료효과 최초 발견
neuroprotective & neurogenesis effects
NIH

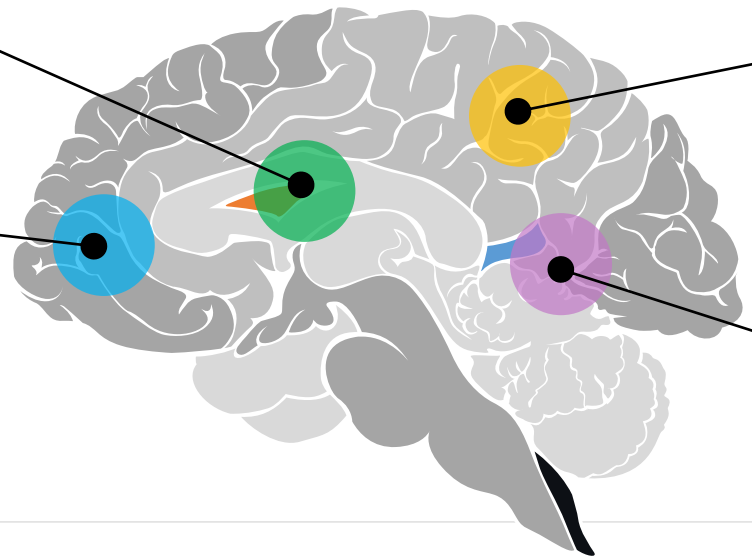
GLP-1 RA (exenatide) 신경병증 억제
인슐린 신호 복구 **MoA**
UNIVERSITY OF LONDON

Parkinson's
퇴행성뇌질환

Alzheimer

Imperial College London
HARVARD UNIVERSITY

GLP-1 RAs의 치매 발생 억제 확인
Real World Data (T2DM)
1995-2017, 120,054명
Nordsjællands Hospital



TBI

희귀 뇌질환
orphan drug

IIH

TEL AVIV UNIVERSITY
NIH
SCHOOL OF MEDICINE CASE WESTERN RESERVE UNIVERSITY
UNIVERSITY OF BIRMINGHAM
invex THERAPEUTICS

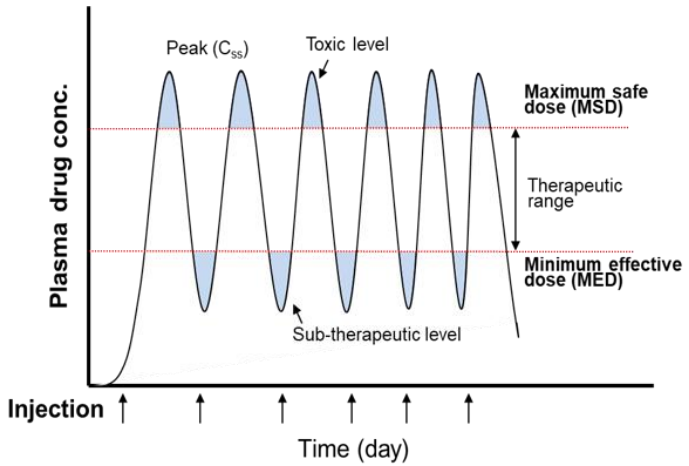
MSA, LID

Potential Indications
Efficacy tested

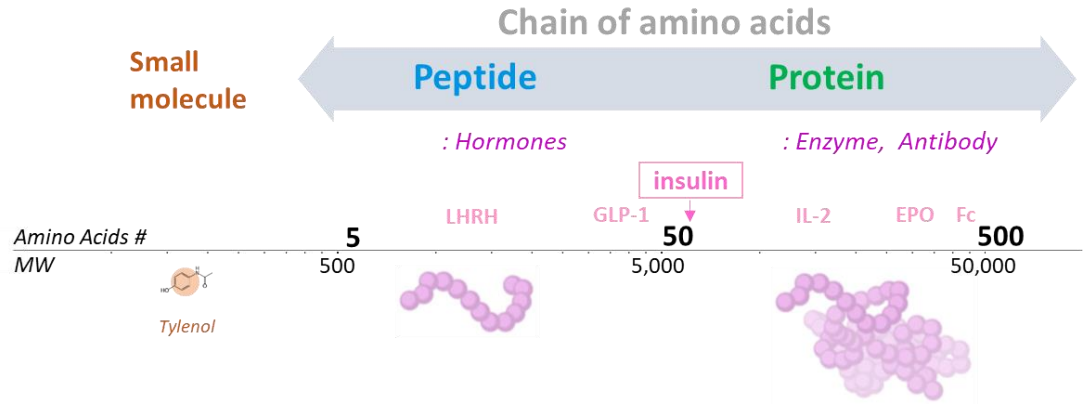
ODD by EMA & FDA

PEPTIDE DRUG

Peptide/Protein biomolecule



- **PRO:** High level of activity and efficacy with less side effects
  약효 우수, 독성 낮음 → 임상성공확률
- **CON:** Short half-life (peptide: e.g. Ex4 2.8hr, CNP 1.6 min), Low stability
  경구투여 어렵다 → 주사제 (자주 투여)



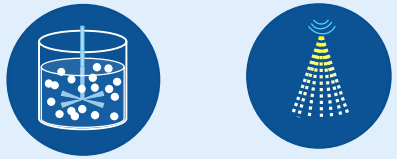
Long-Acting Technology

SR-DDS (Sustained Release)

약물의 구조 변형 없이 지속방출형 제형으로 구현

Microsphere of bio-degradable polymer

FDA-approved PLGA polymer



Emulsion Type

small molecule
short peptide

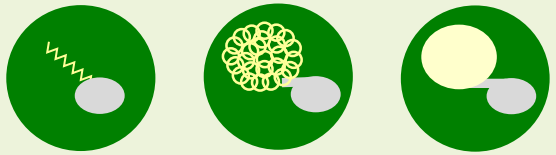
Spray Drying Type

able to larger molecule

Modification / Conjugation

약물의 안정성을 증가 시키는 물질을 결합

Linkage of stabilizer/carrier

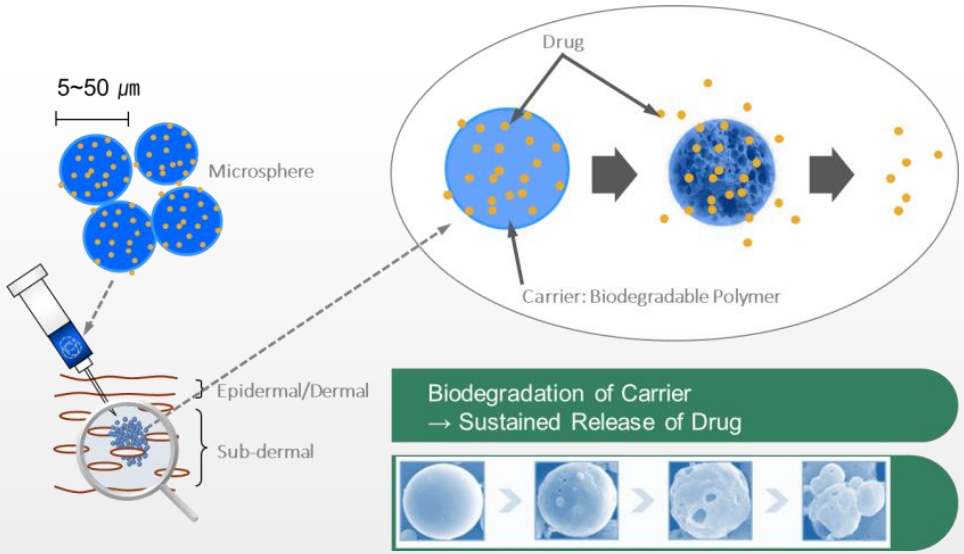


Acylation (Fatty acid)

PEGylation

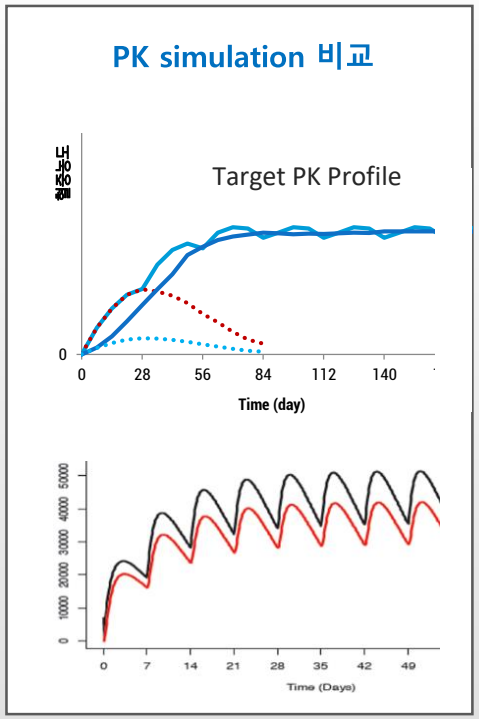
Protein (HSA, Fc domain)

SR (Sustained Release) MICROSPHERE



Control the release profile from 1 week to 6 months

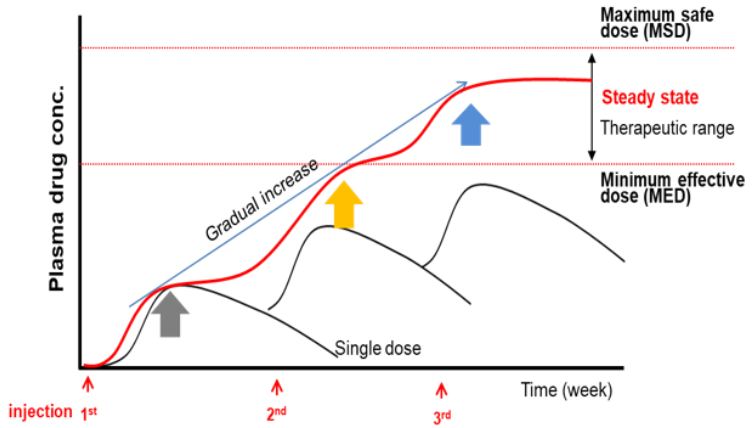
- 환자 투여 편의성 증대 및 최대 약효 지속시간 연장
- Monthly 이상 지속형 구현 가능 (상용화)
- Brain Delivery 유리 (0.1% 미만 → 2% 이상)
- 약효 발현에 이상적인 약물 방출 프로파일 구현



Reduced Side Effects
(Peak-to-through fluctuation)

치료 영역 혈중 농도 유지에 유리 (부작용 방지)

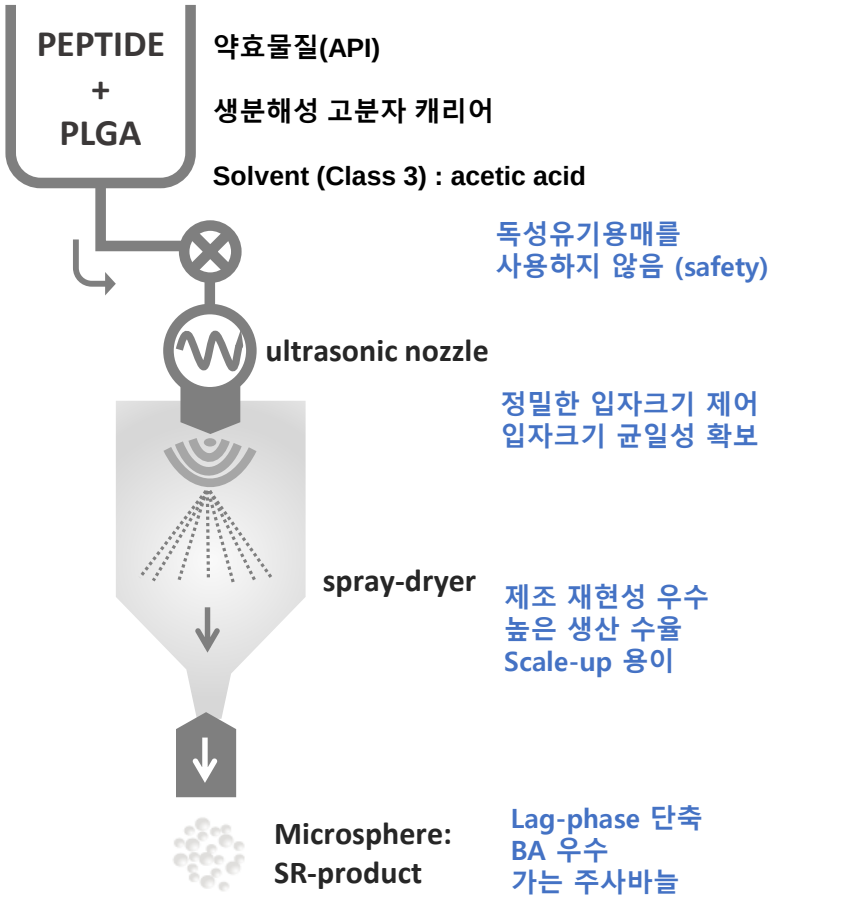
Ideal PK for narrow therapeutic window



- By increasing lead-in period of injected SR-formulated drug
- By increasing drug adaptability with low dosing to subjects

SmartDepot 기술 구현 최신 SR 의약품 제조공정

Ultrasonic Spray-Drying (초음파 분무건조 방식)



기존방식 대비 우수성 (conventional process : emulsion type)

2002

2005

Lab-Scale

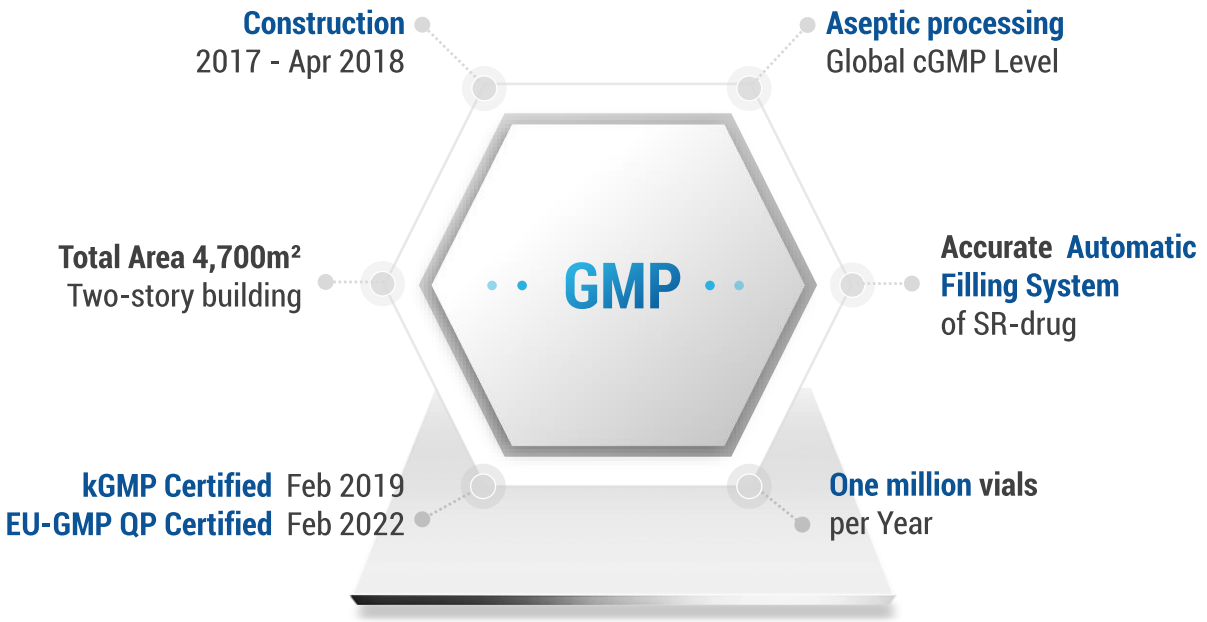
GMP Compliant

2017

Present

임상용 의약품 자체생산

개발 제품의 기술 구현과 대량생산 증명



1. PT320 (SR-Exenatide)

Parkinson's Disease

- 중뇌 흑질의 도파민 분비 신경 세포의 사멸에 의해 나타나는 퇴행성 신경질환
- 심각한 인식 장애와 미약한 언어 장애도 발생하며 만성적이고 진행성 질환
- 표준 치료제는 상실된 Dopamine을 대체하는 레보도파(Levodopa) 계열 약물

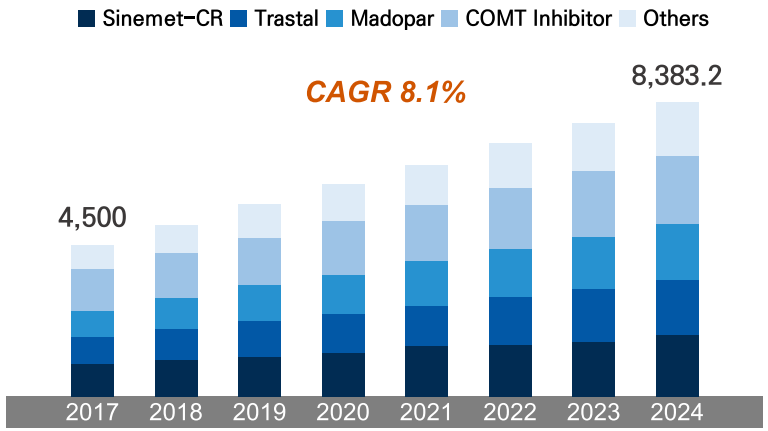
느린 운동(서동증) | 떨림 | 근육 강직 | 자세 불안정

전세계 1천만명 2020년

국내 12만명 2020년

연령이 증가할수록 걸릴 위험은 점점 커지며, 60세 이상에서는 약 1%, 65세 이상에서는 약 2% 정도가 파킨슨병을 앓고 있음

파킨슨병 치료제 시장규모(Mn. USD)



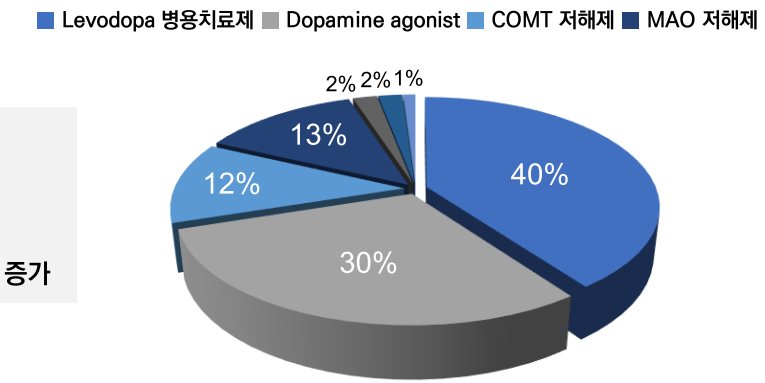
* 자료 : Market Intellica(2019)

[레보도파 약물의 한계]

- 한시적 증상 완화 효능만 있음 뉴런의 사멸을 막지 못함
- 표준 1차 치료 약물이나 점차 약효가 떨어지는 약효소진 현상 발생
- 장기복용 시 LID와 같은 이상 운동반응 부작용 발생
- 현재까지 근본적인 치료제 없음

- Levodopa 병용 치료법과 Dopamine agonist가 전체 시장의 70% 차지
- Symptoms release drug이 전체 차지
- Novel Drugs 개발에 대한 시장 내 수요 증가

파킨슨병 치료제별 판매 비중



1. PT320 (SR-Exenatide)

PT320 significantly improved the PD symptom in preclinical 6-OHDA PD model.

효과적으로 BBB를 효과적으로 통과하며 지속적인 신경보호 효과를 나타냄

1) Animal Model (6-OHDA hemiparkinsonian model)

- The 6-hydroxydopamine (6-OHDA)로 한 쪽 뇌의 dopamine 생산 Neuronal cell을 depletion 시킨 동물 모델 이용 (hemiparkinsonian, Unilateral lesions model)
- Apomorphine/Methamphetamine을 투여하면 뇌 기능이 살아있는 한 쪽 방향으로 rotation하는 특성을 이용하여, apomorphine-induced rotation test를 진행 (imbalance in DA release)

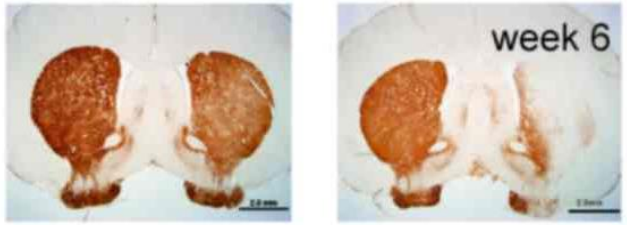
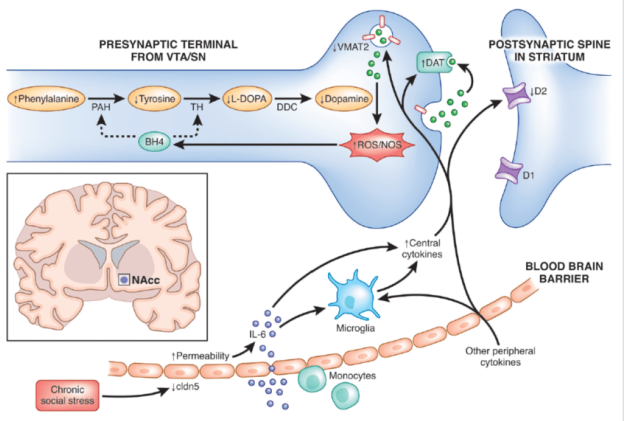
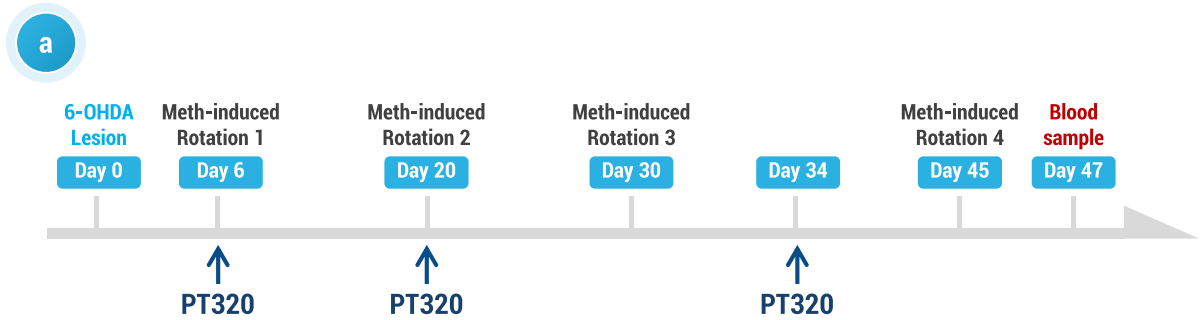
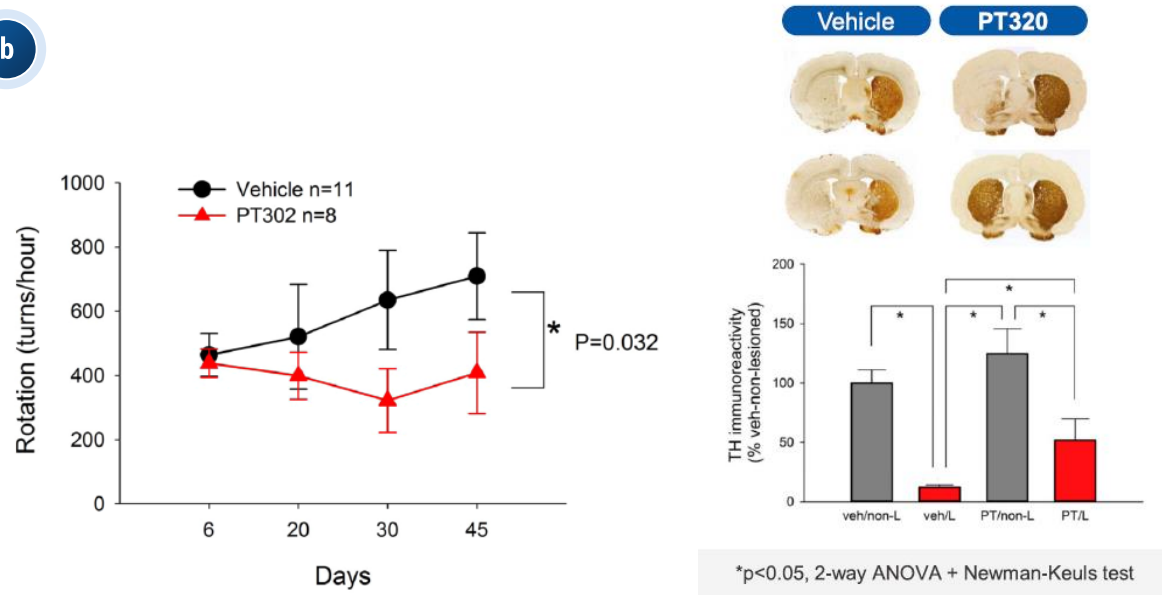


Figure 2. Tyrosine hydroxylase immunohistochemical staining







Ref. Chen et al., Sci Report. 2019

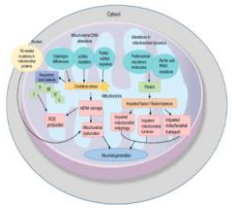
Figure. Post-treatment with PT320 reduces meth-mediated rotational behavior in hemiparkinsonian rats.

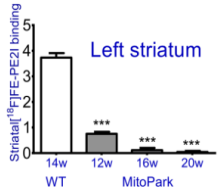
1. PT320 (SR-Exenatide)

PT320 effect in MitoPark TG mice model

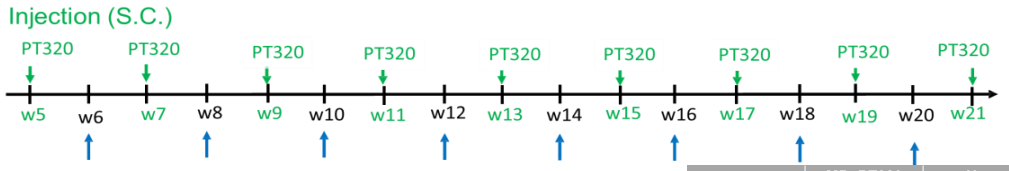
1) Animal Model (MitoPark TG)

- **Mitochondrial dysfunction in PD**
  - Bioenergetic defects by mitochondrial DNA gene mutation
  - Alteration in trafficking and transport (TCA cycle)
- **DA transporter (DAT) promoter/TFAM (transcription factor A, mitochondrial) mutant Cre/loxP TG mice**
  - Dopamine level, 8FE-PE2I PET scan



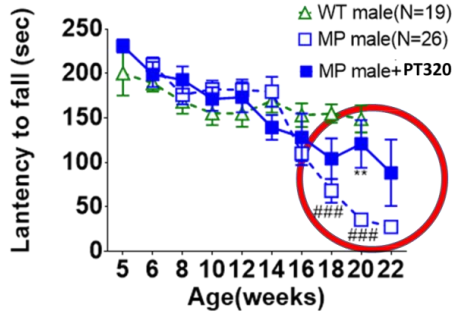


2) Scheme



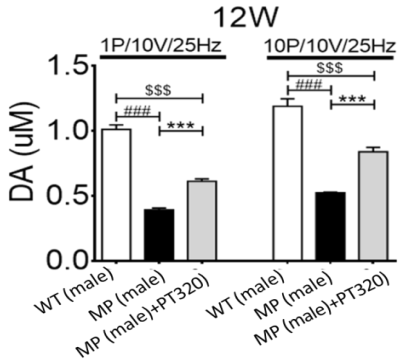
Age (weeks)	MP+PT320 (N number)	Now (weeks)
5W~10W	17(3+5+4+4+1)	10W
10W~11W	14(3+5+4+2)	11W
11W~14W	12(3+5+4)	14W
14W~20W	8(3+5)	22W(LID)
20W~22W	3	X

3) Rotarod test



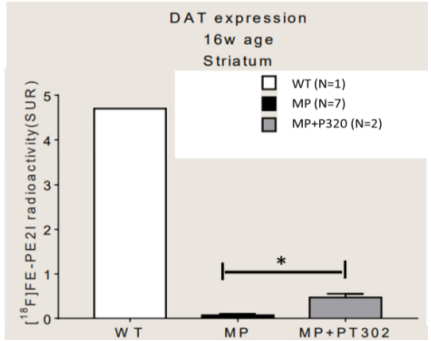
4) Dopamine (DA) releasing Ability Striatum

(cyclic voltammetry)

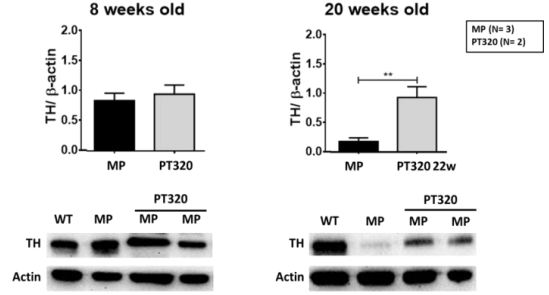


5) Positron Emission computed Tomography (PET) analysis of [18F] FE-PE2I

(a Dopamine Transporter (DAT) ligand)



6) TH staining



Ref. Chen et al., Movement Disorder 2020

PT320 shows a significant mitigation in various movement disorders

Cyclic Voltammetry studies shows an increased dopamine level in PT320-treated MP mice

Tyrosine hydroxylase (TH) levels also increased in the treated mice, and increased PET-DAT (Dopamine transporter)

1. PT320 (SR-Exenatide)

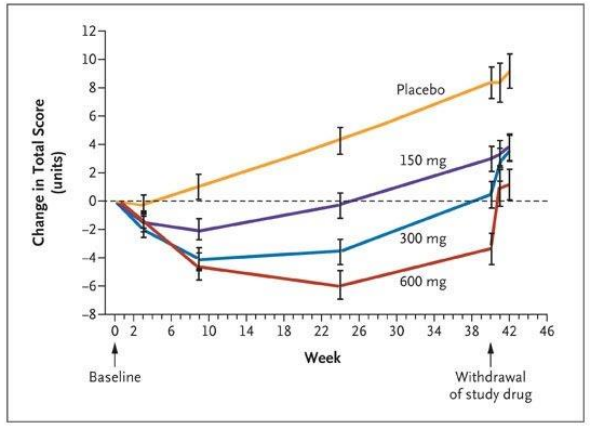
L-Dopa induced Dyskinesia (LID)

L-DOPA에 의한 이상운동증(LID) 모델에서 PT320에 의한 이상운동증 진행 억제 효과 확인

LID 동물행동평가인 AIMS(axial, limb and oro-lingual) score를 통해 평가

Parkinson's Disease

Clinical trials of L-dopa;
Std therapy for PD

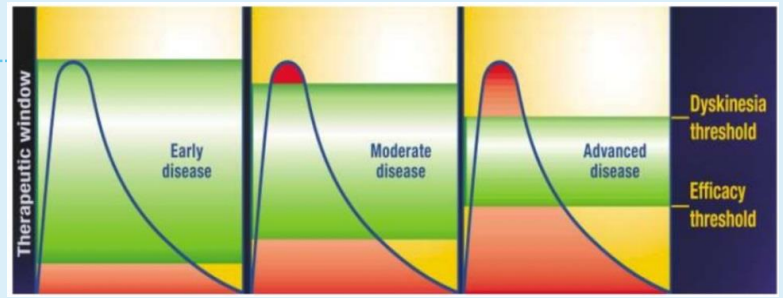


DISEASE **PROCESS**

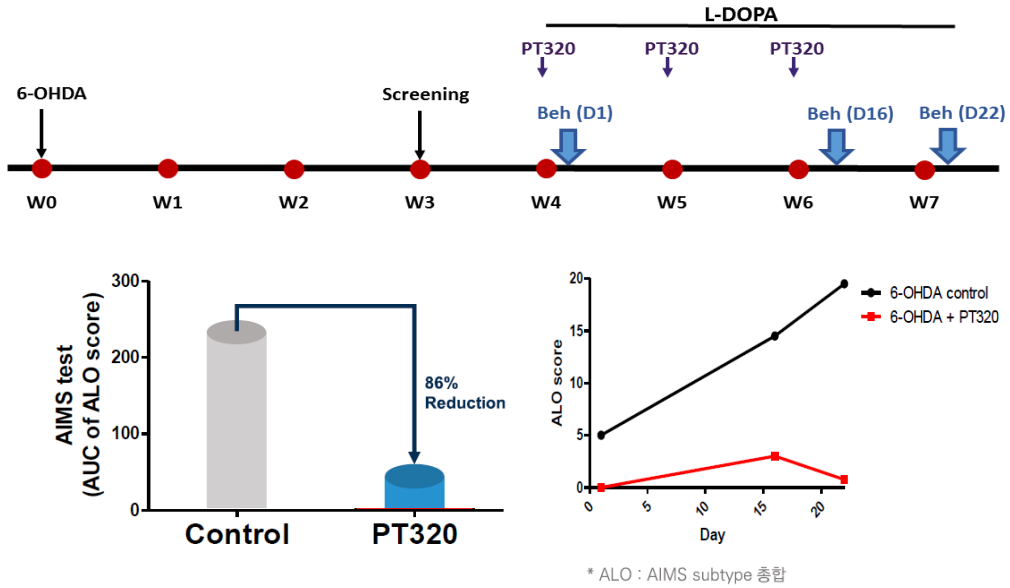
LID occurrence rate
- 5 yr : 30-50%
- 10 yr : 70-90%
- >10 yr : 90%

Dyskinesia

Abnormal involuntary movement



PT320 Inhibit the progression of LID



* ALO : AIMS subtype 총합

Figure 1. **PT320 reduces L-DOPA-induced AIMs in unilaterally 6-OHDA–lesioned rats.**
(A) The dyskinesia (A1: ALO; B1: limbs; and C: axial) significantly correlates with the duration of L-DOPA treatment. PT320 administration significantly reduced (A1) ALO, (B2) limb, and (D) orolingual AIM scores.

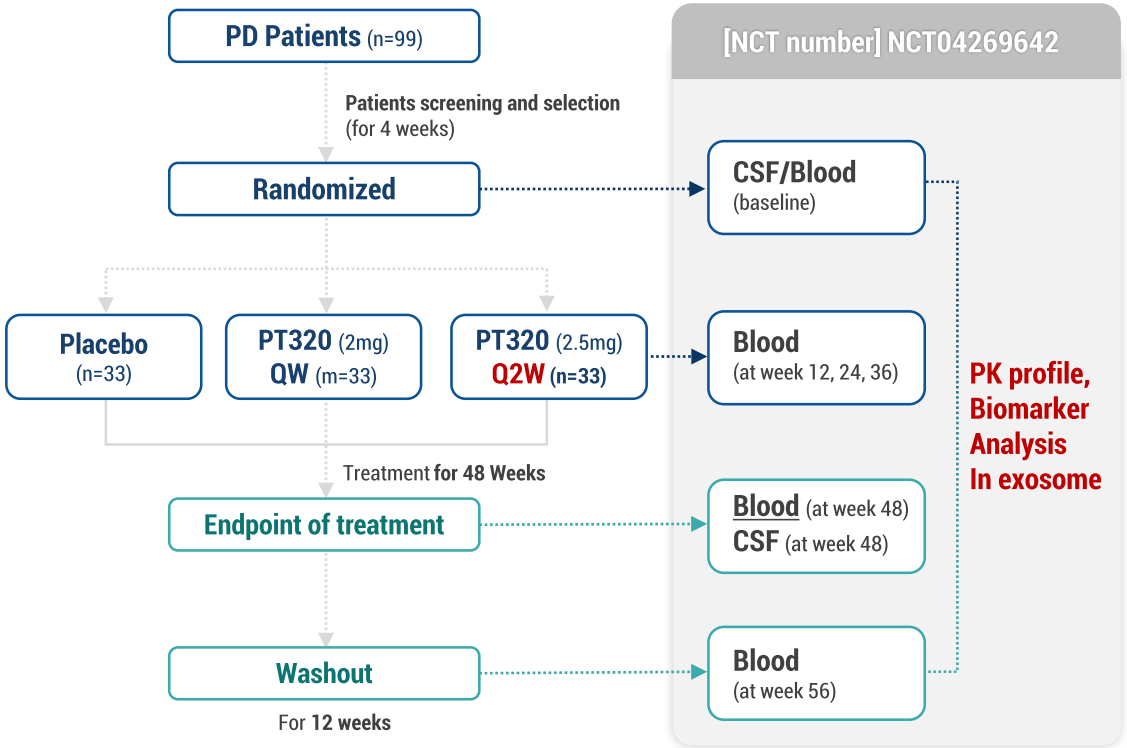
Ref. *Yu et al., 2020. Front. Neurosci.*

Unmet medical needs of PD
- L-dopa 유래의 neuronal toxicity
- 이상운동증 억제
- 새로운 작용 기작을 가진 진행억제제 개발

Power of PT320 in PD
- L-dopa 병용 투여 및 용량 감소
- L-dopa 부작용 감소
- Frontline therapy 가능성

1. PT320 (SR-Exenatide)

PHASE II STUDY



Primary Endpoint	**Change of MDS-UPDRS part 3 score from baseline at 48 weeks** (운동장애 평가)
Secondary Endpoint	• PET scan (dopamine level) • MDS-UPDRS part 1, 2 and 4 scores • K-PDQ-39 score • MoCA-K score • K-NMSS score • Hoehn and Yahr stage • L-dopa stratification (post-hoc)

임상 SITE

서울대학병원
서울아산병원
삼성서울병원
서울보라매병원
분당서울대학교병원

해외 SAB

Dr. Greig Nigel
미국 NIA, NIH

Dr. Tom Foltynie
영국 UCL

Dr. Choi DS
미국 Mayo Clinic

진행상황

2021.01
환자모집 완료 (100명)

2021.12
48주 투여 완료

Washout 진행중

2022 하반기
결과 예정

글로벌 Licensing out 추진

OBJECTIVE

초기 파킨슨병 환자 대상 약물 용량 설정 및 효능 확인

A Multi-center, Randomized, Double-Blind, Placebo-Controlled Phase 2a Study to Evaluate the **Efficacy** and **Safety** of Subcutaneous SR-Exenatide (PT320) in Patients with Early Parkinson's Disease

UNIQUENESS

파킨슨병의 글로벌 전문가 그룹 구성

정밀한 임상시험계획서 디자인 (영국 UCL Dr. Foltynie 총괄)

- PK analysis in **CSF** and blood sample
- Potential replacement therapy of L-Dopa to PT320, if L-dopa stratification including patients with L-dopa free has significant therapeutic effects on PD.

15 BIOMARKERS

세계 최초 객관적 바이오마커 확인 임상 (뇌척수액 및 혈액검사)

과학적 사실에 기반한 Biomarker 확인 (약동학, Exosome 분석 등)

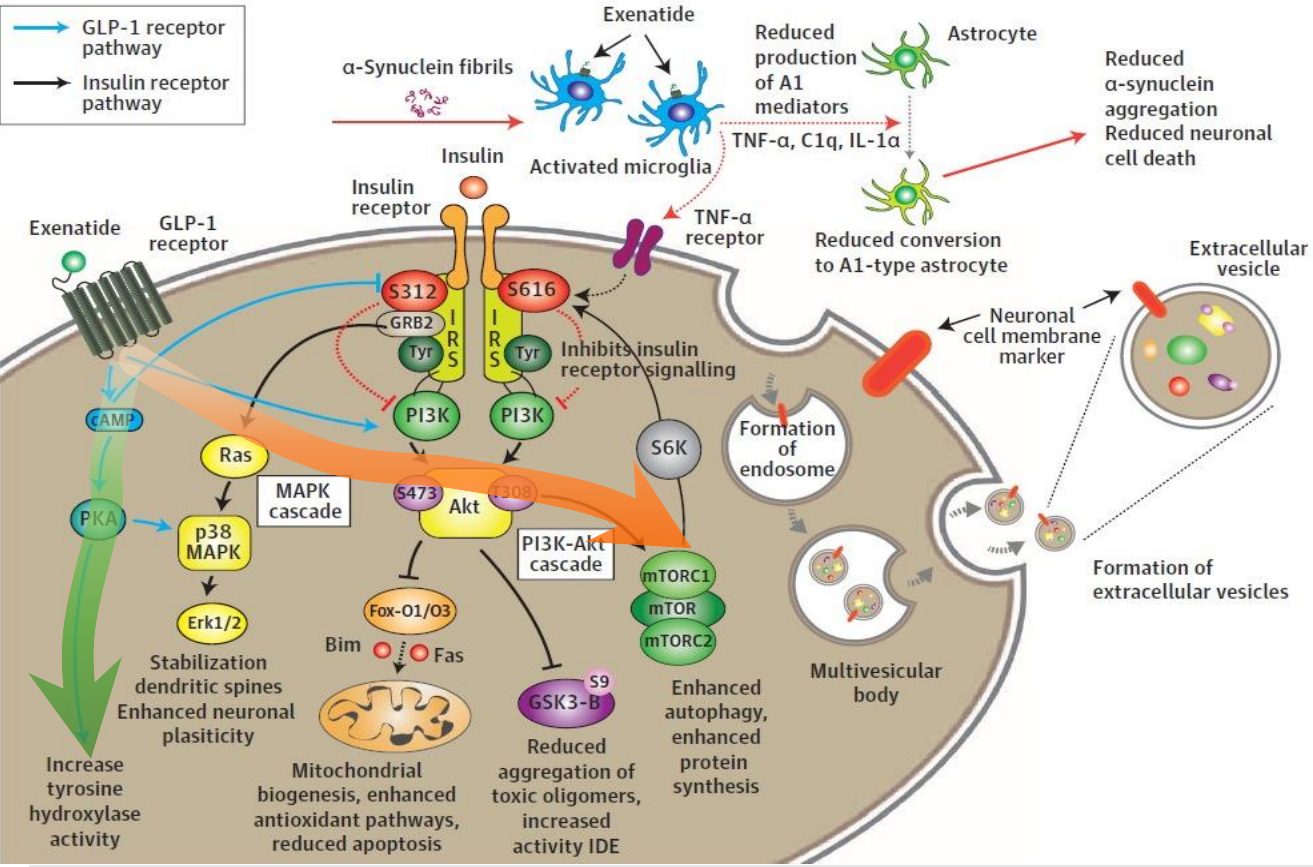
- Exosome and CSF samples:, t-p38 MAPK, p-p38 MAIRS-1 p-Tyr, IRS-1 p-S616, IRS-1 p-S312, total (t-) AKT, phosphorylated (p-) Akt, t-mTOR, p-mTOR, t-GSK-3β, p-GSK-3βPK, t-Erk1/2, p-Erk1/2, t-JNK, p-JNK
- Biomarker study will be performed and analyzed at NIH

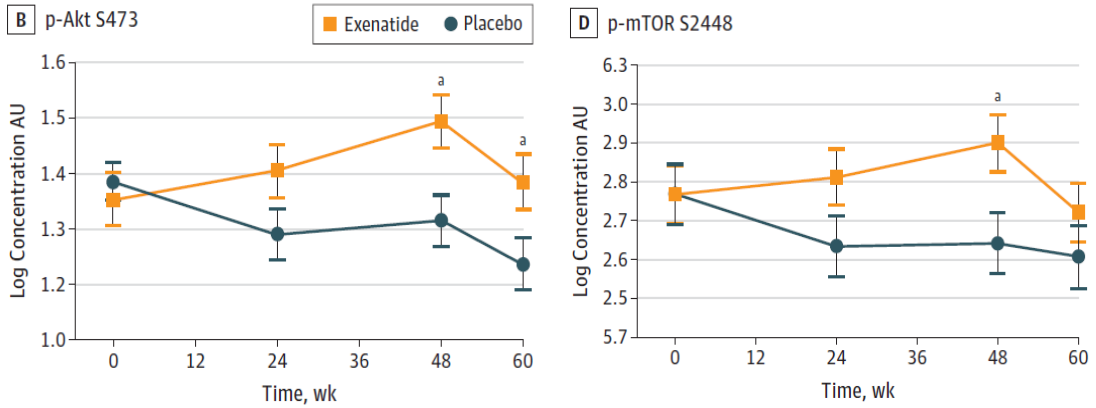
1. PT320 (SR-Exenatide)

GLP-1 RA FOR Parkinson's disease: Biomarkers and MoA

Active Signal Pathway

- **GLP1 receptor pathway:** Tyrosine hydroxylase activation (Dopamine metabolism pathway)
- **Insulin receptor pathway:** AKT-mTOR axis (enhanced autophagy and protein synthesis, neuronal cell survival)





Ref. Athauda et al., JAMA, 2019

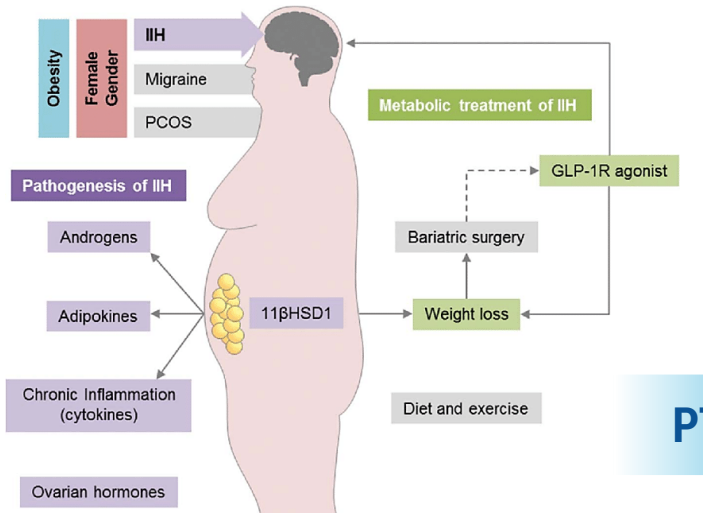
Proposed model from Phase II, by Dr. Foltynie for the Neuroprotective Effects of GLP-1 in Neurons

The cross-talk with insulin receptor signaling pathways and GLP1 receptor pathway, proven by the exosome analysis from Ph2 study serum samples with Neuron-specific membrane surface marker L1CAM (L1 cell Adhesion Molecule)

1. PT320 (SR-Exenatide)

ODD: Idiopathic Intracranial Hypertension (IIH) 희귀뇌질환

Pathogenesis of IIH



- ✓ Excessive abdominal fat
- ✓ Hyper-intense fluid collection in optic nerves
- ✓ Loss of peripheral vision

뇌척수액 (CSF) 축적 → 뇌압 상승 → 시신경 압박

극심한 두통, 메스꺼움, 시력감퇴, 이명, 실명

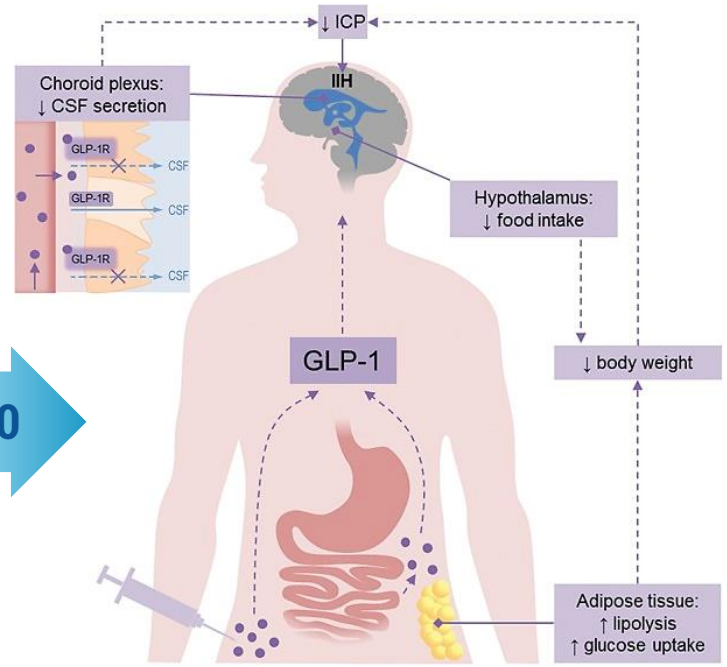
20~30대 주로 발병, most common in women who are obese

지난10년간 발병율 350% 증가

치료제 없음 / 두개 내압 낮추는 수술, 증상 완화제

PT320

How PT320 works



- ➢ Decrease CSF secretion
- ➢ Reduce appetite and body weight
- ➢ Decrease intracranial pressure (ICP)

EuGMP QP Audit Clearance

Global Phase 3 in UK, EU, USA, AUS Scheduled in 2022

PT320

- 주 1회 주사 가능한 지속형
- 치료 효과에 가장 적합한 약물 방출 PK
- 완제의약품 GMP 대량생산시설
- CMC / 임상용 시료 및 제품 독점 공급

ODD

희귀의약품 지정

- 미국 7년, 유럽 10년 독점 판매 자격 획득
- 시장규모: $1.3B (2021) → $1.7B(2030)

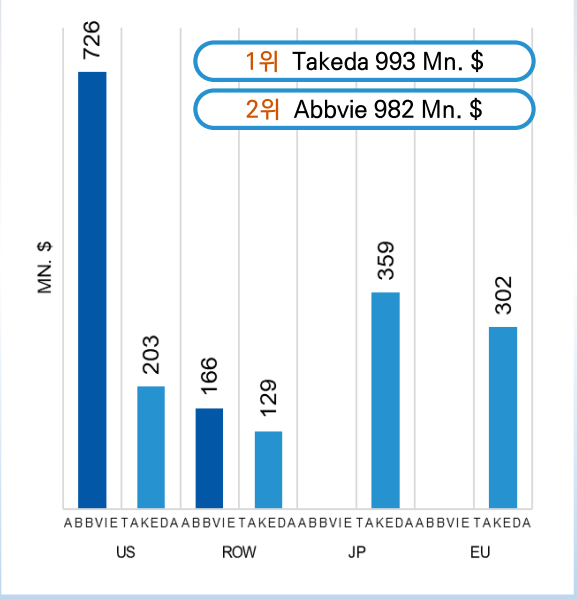
2. PT105 (SR-Leuprolide); Clinical Stage (BE) Asset

치료제 개요

작용기전	LHRH 작용제는 뇌하수체에 작용하여 Leteinizing Hormone(LH) 자극에 대해 뇌하수체 수용체가 탈감작되도록 유도해 LH 분비를 억제하여 성호르몬 생성을 감소시킴
적응증	1) 전립선암 2) 유방암 3) 자궁내막증 4) 자궁근종 5) 성조숙증 (중추성 사춘기 조발증) 등
Challenge	Takeda/Abbott (TAP)의 Lupron depot가 1989년 출시된 후 높은 시장성에도 불구하고 Generic drug 출시 되지 않고 있음 (선진국 시장, PK-based BE study)

Global Market

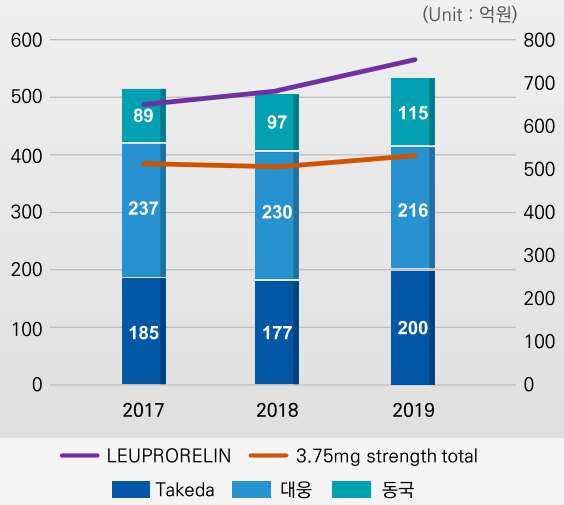
Sales (Leuprolide) $1,900 M (2018)



Local Market

IMS 매출액 530억원 (2019)

- 1위 – 루피어(대웅) 216억원
- 2위 – 루프린(다케다) 200억원



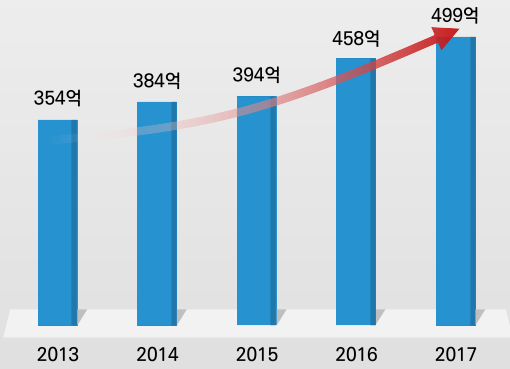
*Source : IMS data

성조숙증 환자 추이

진단기준 : 여(8세 이전), 남(9세 이전) 2차 성징 시작

* 자료 : 연합뉴스 (김영은) / 국민건강보험공단 제공

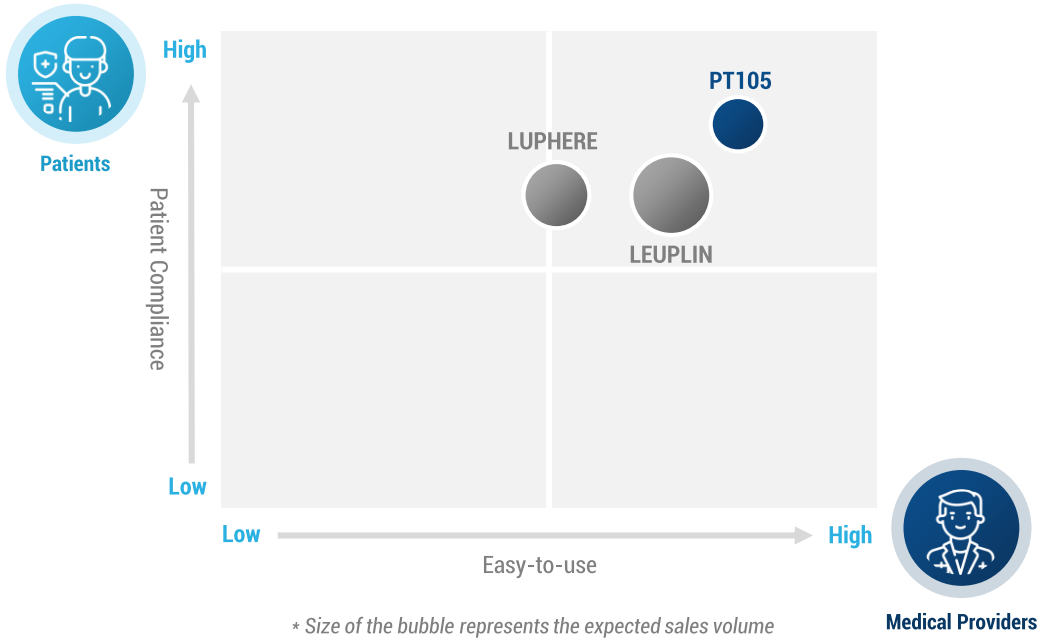
최근 5년 성조숙증 진료비 추이



* 자료 : 연도별 '성조숙증' 진료비 현황(국민건강보험공단 제공)

2. PT105 (SR-Leuprolide); Clinical Stage (BE) Asset

PRODUCT POSITIONING



* Size of the bubble represents the expected sales volume

펩트론-PT105	구분	국내 기존 제품	TAKEDA-루프린
3.75mg	Leuprolide acetate	3.75mg	3.75mg
44.1mg	분말	44.1mg	44.1mg
1ml 주사 투여량 감소	현탁액	2mL	1mL
6R (h:40mm, d:20mm)	분말용 vial	6R (h:40mm, d:20mm)	① 바이알 + 앰플 (루프린주) ② Dual Chamber prefilled syringe (루프린 DPS주) *국내는 DPS 충전 가능업체 없음
1.25mL Syringe (prefilled syringe)	현탁액 용기	3mL Syringe (Prefilled syringe)	
• 국내 기존 제품 대비 작은 PFS (1/2 크기) • Compact 한 제품포장 – 제품 운반 및 보관 효율성 향상	제품 포장 크기	제품포장 크기가 큰 편임	
26G-27G까지 가능 (0.41mm – 0.46mm) 주사 통증 감소	NEEDLE 두께	24G (0.57mm)	25G~23G (0.51mm-0.64mm)
적용	Vial Adaptor	없음	적용
분무 건조	제조방법	분무 건조	에멀전
• 공정 단순화 • 수율 향상 (약80%) • 연간 생산성 향상 • Aseptic process	제품 생산성	펩트론 기술이전	N/A

Competitive Advantages with Others

① PT-105 shows better **patient compliance** as it provides smaller needle gauge than other competitors

② **Pricing Competitiveness** by simplified process and increased productivity

③ Peptron has a proven track record in developing proprietary SR platform technology (SMART DEPOT™)

마케팅 포인트

- 2020년 개정된 약사법에 따라, **PK/DMF 등록이 안된 의약품은 약가의 최대 72% 인하** (2등급 의약품)
- 수익성 및 인식의 저하로 인한 **경쟁 우위 마켓 포지션 가능**
- **PK 기반의 PT105**

First-in-Class **Novel Antibody**

PAb001

Binds to MUC1C, which is overexpressed in cancer

IP PROTECTED

- **Immunostimulatory compositions comprising liposome-encapsulated oligonucleotides and epitopes**
  - Korea Patent Number : 10-1435953
  - US and JP: US9125952 / JP5646620
- **Antibody specifically binding to MUC1 and use there of**
  - Korea Application Number: 10-2018-0032592
  - PCT Application Number: PCT/KR2018/003267
- **MUC1 Car, -T, NK, -Ma**
  - Korea Application Number: 10-2020-0057880

HUMANIZED

- **PAb001 is a humanized IgG1 antibody.**
  (Originally developed in mouse by CpG-DNA Liposome technology, referred as PepGen Technology)

INDICATION

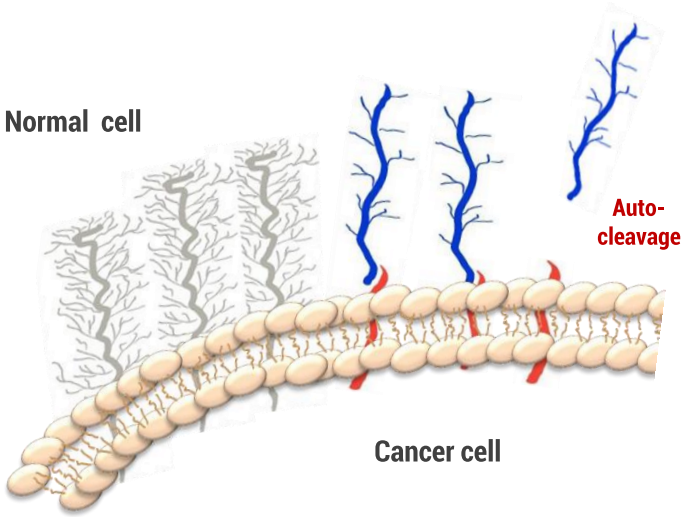
- **FDA's Fast-track designated diseases**
  (Triple Negative Breast Cancer, Ovarian Cancer, Non-Small Cell Lung Cancer, Pancreatic Cancer and etc,.)

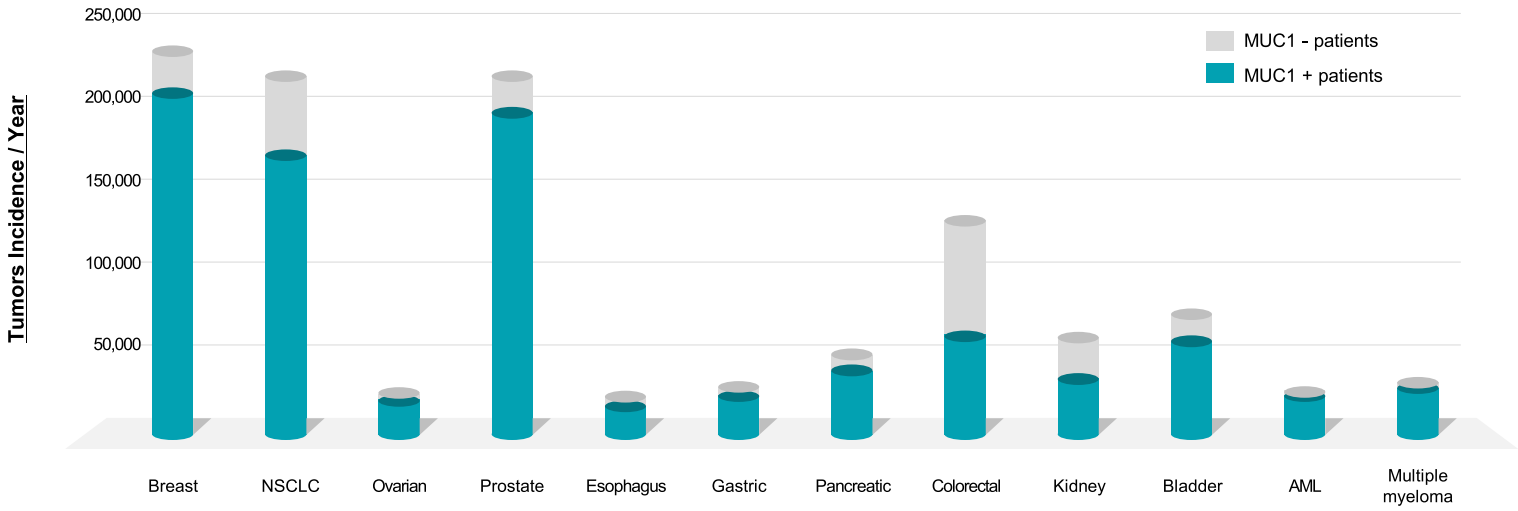
A novel target, MUC1-C

Mucin-1 (MUC1)

유방암, 췌장암, 난소암, 대장암, 급성 골수성 백혈병 등 다양한 암 조직 및 암 줄기세포에서 과발현되는 단백질

미국 국립암센터에서 발표한 75개 암 표적물질 중 2위에 랭크된 강력한 암 치료용 표적 물질





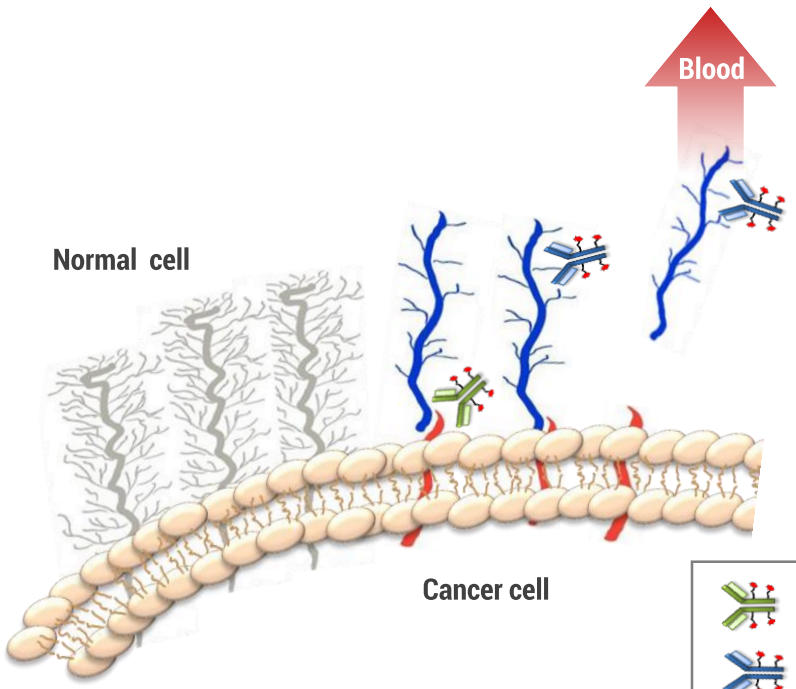
대부분의 암, 특히 전이성 암에서 높게 발현되는 단백질 '뮤신1'

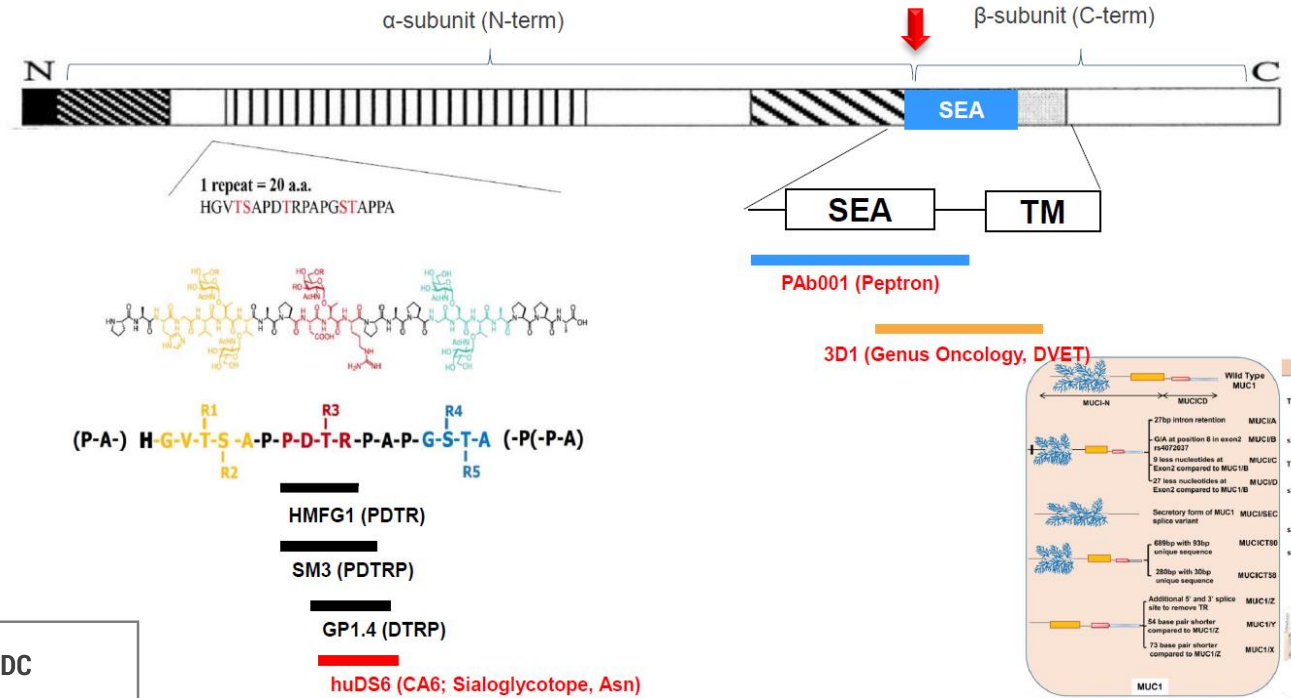
11개 주요암에서 평균 85%(최소 50%, 최대 100%)의 발현율

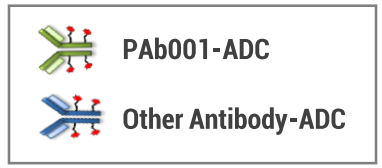
뮤신1 항암 항원인 CA15-3, CA19-9, CA27-29는 FDA에서 승인된 암 진단 물질로 사용

PAb001 특성 및 경쟁력

- 뮤신1 단백질 구조 중 정상세포 대비 암세포에서 특이적으로 발현 부위에 결합하는 항체
- 타 개발사의 뮤신1 타겟 항체는 혈액 내로 분비되어진 shedding domain에 결합하여 암세포 표적율 낮음
- PAb001은 암 세포에 고정되어 있는 뮤신1 domain에 결합함으로, 암세포 표적율 매우 높고 정확함

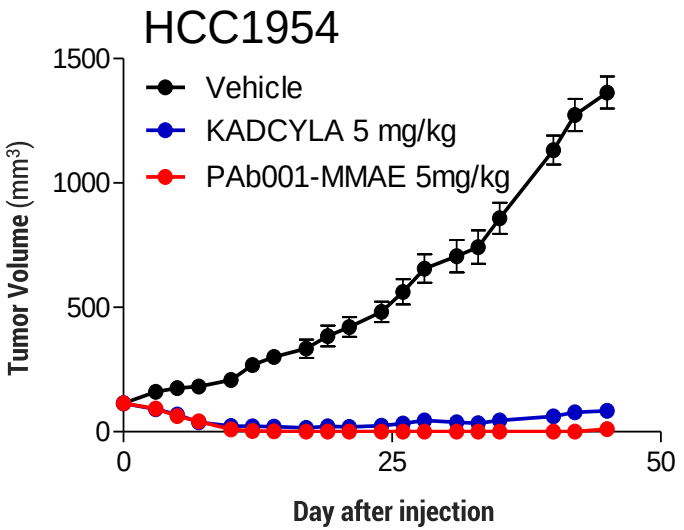




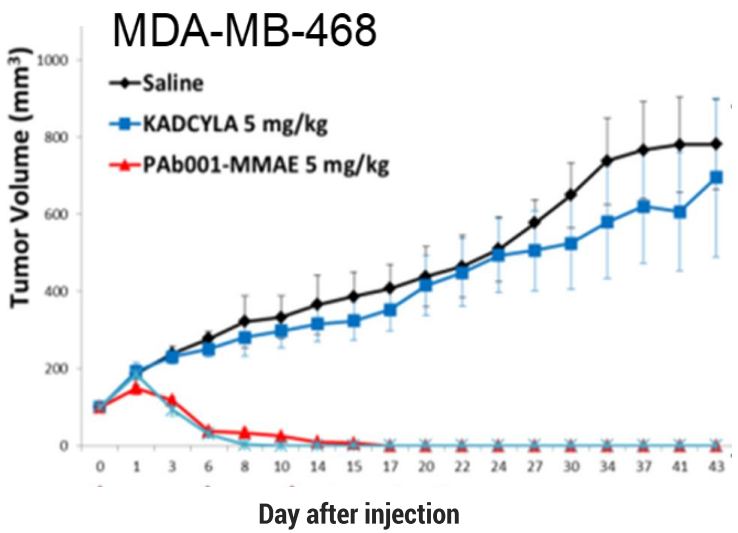


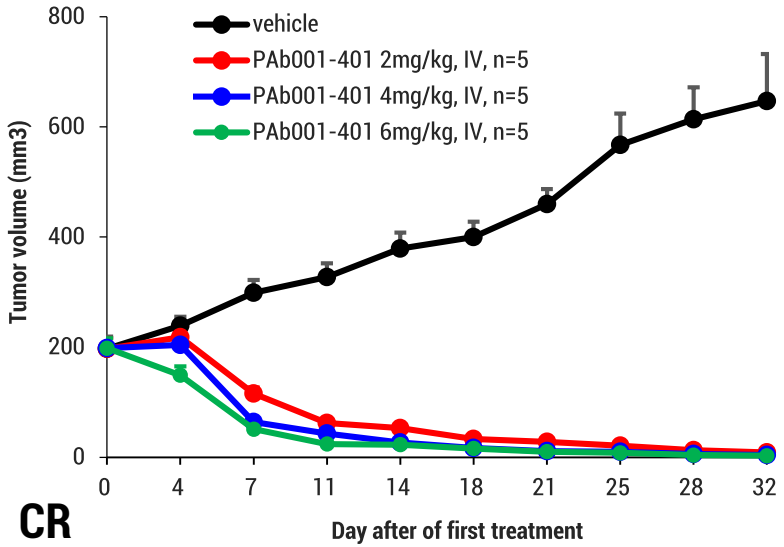
MED: In vivo anti-tumor activities of PAb001-ADC in CDX

Her2+/MUC1+ BC



Her2-/MUC1+ TNBC





CR

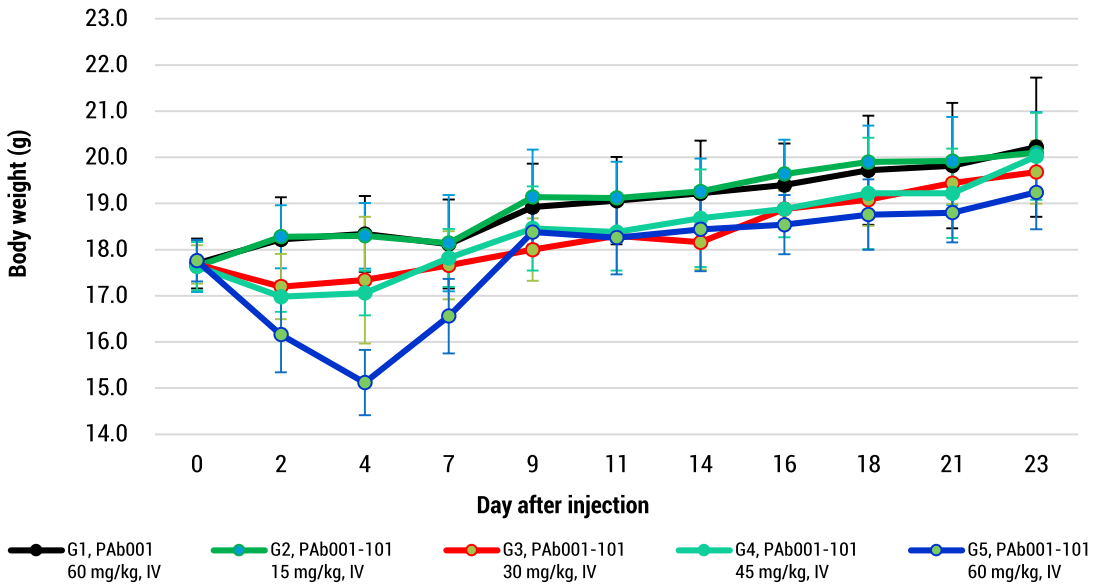
Anti-tumor activities of PAb001-MMAE were evaluated in cell lines-derived xenograft (CDX) models from Her2+/MUC1+ BC (HCC1954) and Her2-/MUC1+ TNBC (MDA-MB-468).

- Tumor growth inhibition (TGI) was measured at the end-points compared to the group between saline- and PAb001-MMAE-treated groups.
- PAb001-DC treatment induced complete tumor regression (CR) in 5 out of 5 mice in HCC1954 CDX and 4 out of 5 mice of MDA-MB-468-CDX models.
- Minimum effective dose (MED) of PAb001-MMAE was at 2 mpk.

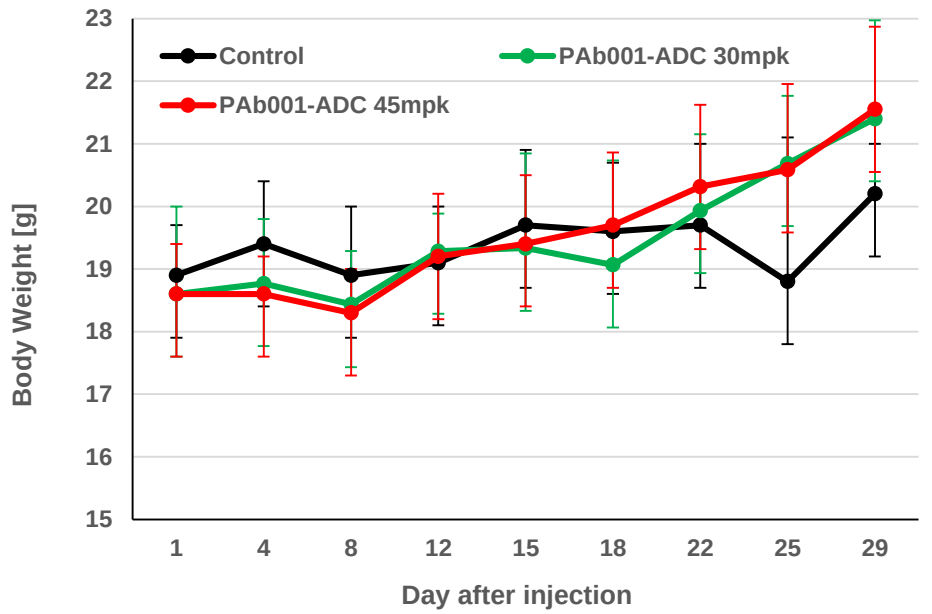
- MDA-MB-468 Xenograft 동물모델에서 종양 크기 감소와 생존율에서 의미 있는 결과 확인 * xenograft model : HCC1954와 TNBC 세포주(주1회)인 MDA-MB-468 세포주(주1회, 총3회 투여)를 이식하여 제작
- 2mg/kg, 단회 투여시에도 complete response 확인

MTD: In vivo Toxicology of PAb001-MMAE

Body weight change in high doses of PAb001-MMAE in WT mice



Body weight change in high dose of PAb001-MMAE in hMUC1 TG mice



CONCLUSION

- Single injection of PAb001-MMAE doesn't show a lethal concentration at 60 mg/kg in wild type C57BL/6 mice.
- At 30 mg/kg & 45 mg/kg of PAb001-MMAE shows a slight body weight loss in both wild type and hMUC1 transgenic mice, which is recovered after day 8.
- Human 뮤신1이 발현되는 transgenic 마우스에 PAb001–ADC를 투여한 뒤, PAb001–ADC 독성 확인
- 투여 후 29일까지 PAb001–ADC 45mg/kg이 투여된 마우스의 체중 변화가 대조군 대비 감소하지 않음
- PAb001의 ADC로의 개발 시 투여 가능 용량이 높을 것으로 예상

PAb001-ADC Licensing-Out

총 계약 6천억원 규모 ($544M +Royalty)

QILU Pharmaceuticals (제노제약, 齐鲁制药)

1. 전 세계 항암시장에서 9위(매출액 기준)에 올라 있고 전체 제약·바이오 업체 중 43위인 글로벌 회사
2. 항체를 생산하는 의료기기 제조 및 품질관리기준(GMP) 시설에 ADC를 생산할 수 있는 GMP 시설까지 보유
3. 임상개발 측면에서 빠르게 진입할 수 있을 것이라는 전략적 판단

Top Global Pharmaceutical Company Report. Sep. 2020

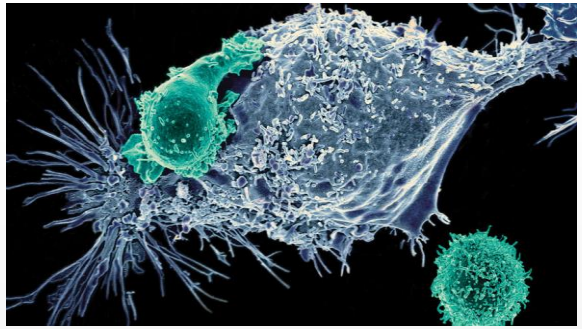
Top Branded Pharmas in Oncology

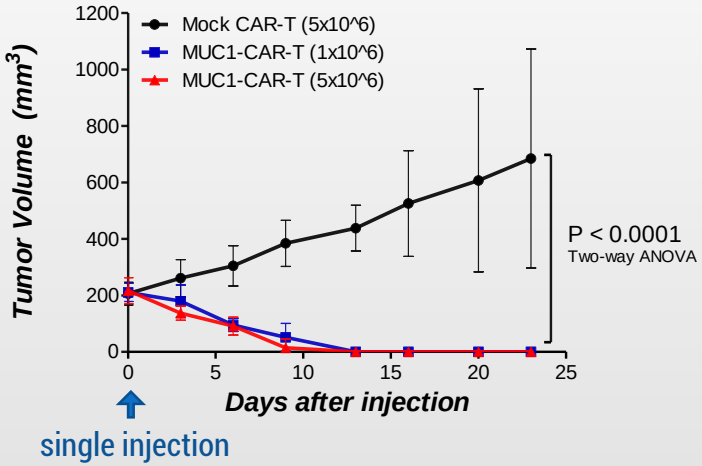
It is fair to say that oncology is largely the land of the biggest pharmaceutical companies with strong contributions from specialty players such as Ipsen, Incyte, Ono and Seattle Genetics. It's also noteworthy how large Chugai has become, largely by selling Roche antibodies in the Japan market (but also by selling its own antibodies through the Roche system).

Similarly, Hengrui has become quite large on the back of selling a deep portfolio of cytotoxics and kinase inhibitors into the China market. Like Hengrui, Qilu has become an increasingly important player in the China market, selling several billion dollars of oncology products into the Chinese hospital system. A key emerging player for the China market is BeiGene. This company is marketing a group of Celgene products in China while developing its own pipeline of differentiated kinase inhibitors and immune-oncology antibodies.

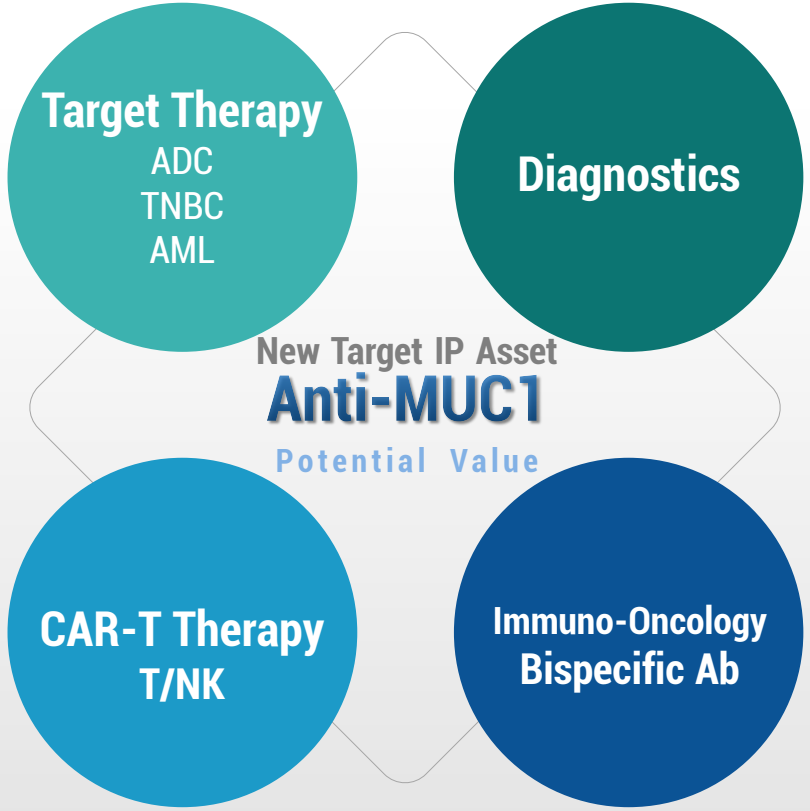
Rank	Company	HQ Country	Focus Area	Value ($mm)	Revenue ($mm)
1	Pfizer	United States	Kinase inhibitors	253,889	49,197
2	Merck	United States	Immuno-oncology	235,456	47,194
3	Roche	Switzerland	Antibodies	234,176	49,719
4	Novartis	Switzerland	Kinase inhibitors	202,035	49,528
5	AstraZeneca	United Kingdom	Kinase inhibitors	160,415	25,699
6	Bristol-Myers Squibb	United States	Immuno-oncology	158,919	34,862
7	Chugai	Japan	Antibodies	70,880	6,809
8	Hengrui Medicine	China	Diversified	69,196	3,478
9	Qilu Pharma	China	Diversified	62,280	3,600
10	Daiichi Sankyo	Japan	ADCs	51,134	8,993
11	Merck KGaA	Germany	Immuno-oncology	32,551	7,535
12	Astellas	Japan	Androgen deprivation	26,305	11,815
13	Seattle Genetics	United States	ADCs	25,140	1,016
14	Hansoh Pharma	China	Kinase inhibitors	24,765	1,141
15	Eisai	Japan	Cytotoxics	23,972	6,560
16	Kelun Group	China	Immuno-oncology	21,540	6,000
17	BeiGene	China	Diversified	18,929	225

PAb001-CAR: Cell therapy for solid tumors





single injection



CAR-NK

THERABEST
A Pioneer In Convergence Therapeutics

유도만능줄기세포(iPSC) 유래 NK 세포 분화 기술

(교토대 야마나카 신야 교수의 CiRA 연구소)

세계 최초 동종유래 (allogenic) 세포치료제 개발 추진

NK 세포

거부 반응 GVHD(이식편대숙주질환) 부작용 및

사이토카인 폭풍 낮음

고순도 분리 배양 어려움

→ NK 세포 대량 배양·생산 공정 확보

- 고품질의 균질한 제품 지속 공급 가능
- iPSC 무한 증식 및 배양 통한 높은 생산성
- 상업화에 이상적인 기성품 (off-the-shelf) 모델

Anti-tumor activities of PAb001-Car *in vitro* and *in vivo*

- MUC1-C-directed CAR-T cells expressing 4-1BB and CD3z (2nd generation Car-T)
- PAb001 Car-T cell activity is dependent on MUC1-C expression in cancer cells, showing a similar granzyme B, IFN-r secretion levels with CD19-Car-T.
- PAb001-Car-T shows complete regressions in the CDX model of breast cancer after single injection.

Science News; Labiotech