KOREA DRUG DEVELOPMENT FUND

KOREA
DRUG
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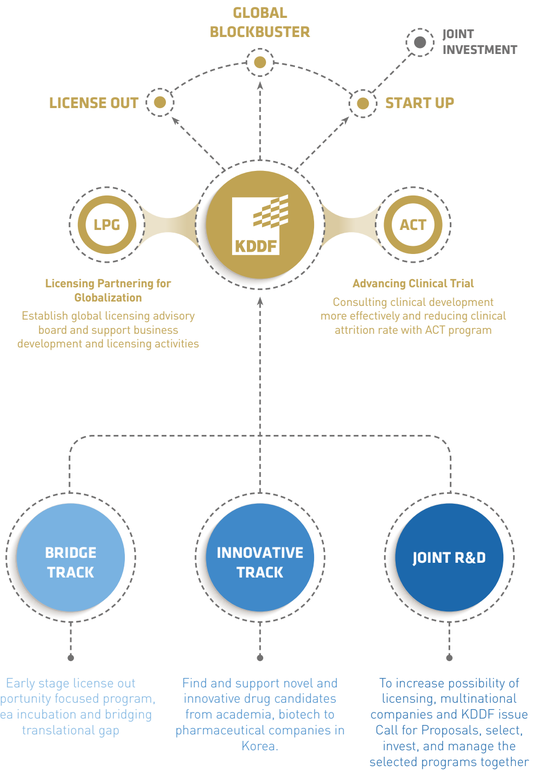
FUND

KDDF
Korea Drug Development Fund

Homepage www.kddf.org **Contact** kddf@kddf.org **TEL** +82-2-6379-3050
Address 9F KPX building, 137 Mapodaero, Mapo-gu, Seoul, 04143, Korea

BUSINESS MODEL DIAGRAM



KDDF
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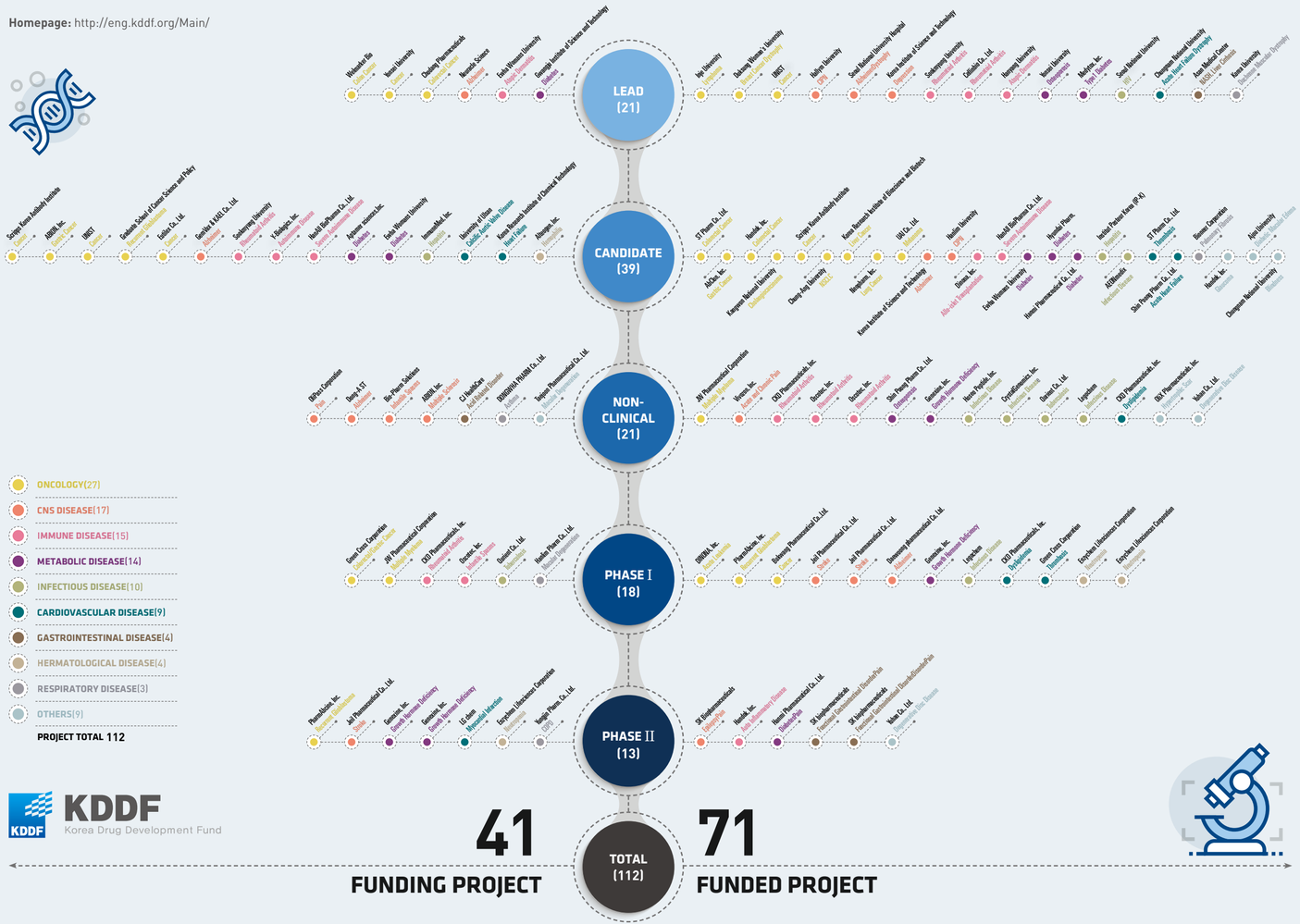
R&D PIPELINE

Homepage: http://eng.kddf.org/Main/



KDDF
Korea Drug Development Fund

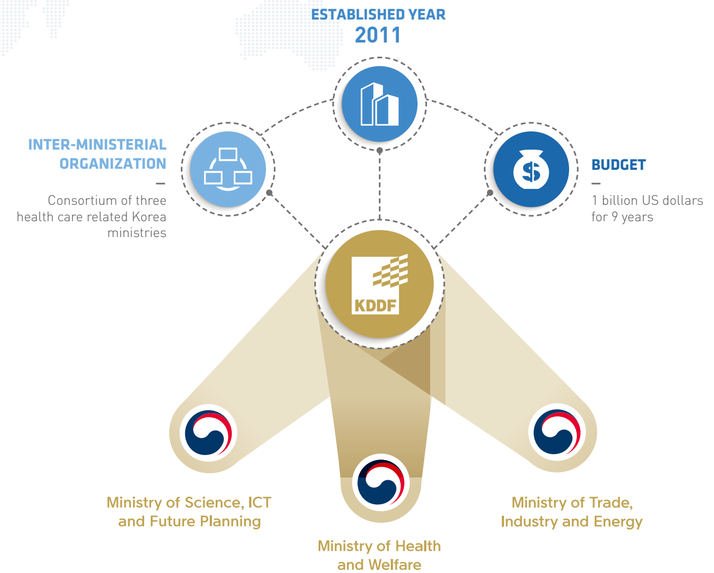
41
FUNDING PROJECT

71
FUNDED PROJECT

R&D PIPELINE

KOREA DRUG DEVELOPMENT FUND

KDDF has supported all stage of drug development with brilliant achievements. As of 2017, 20 assets in different phases of drug development have been successfully transferred to domestic and abroad companies. Licensing deal value totaled more than 3.5 billion USD up to now.

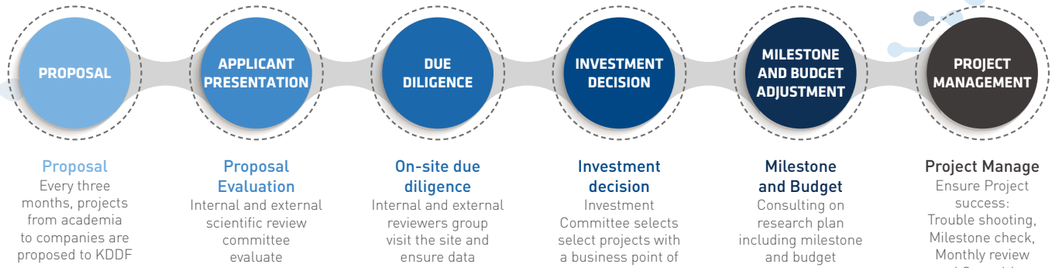


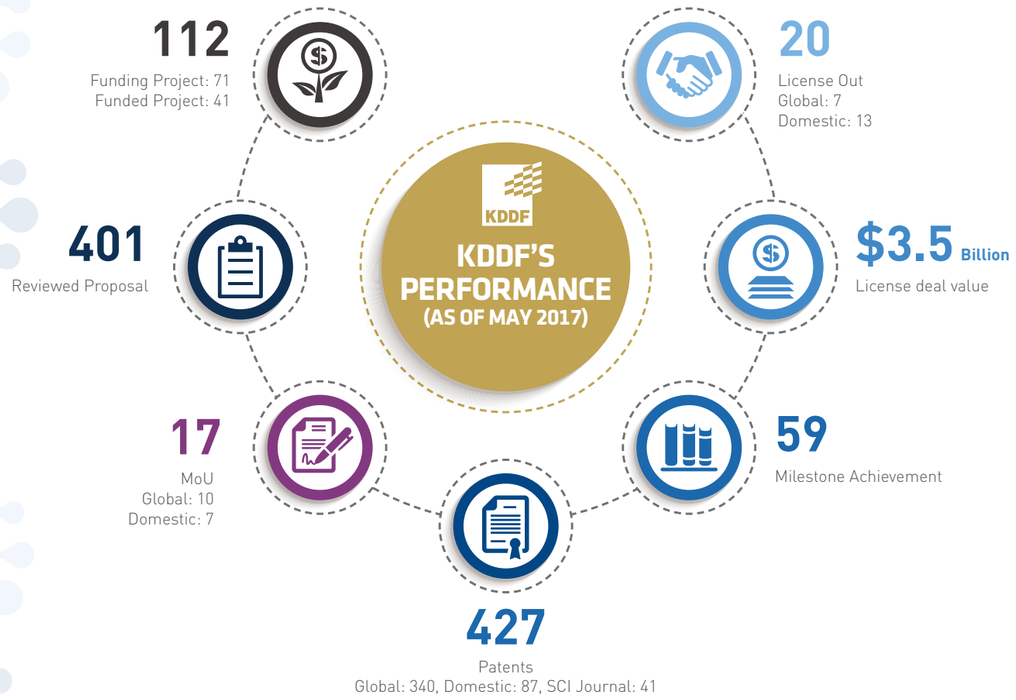
KDDF HAS

- Top-notch proposal screening system
- Value focused project management system
- Large pool of excellent domestic and foreign experts in different drug development field
- International and domestic network in business development field
- More than 112 pipeline in various therapeutic areas from lead stage to clinical trial stage

KOREA DRUG DEVELOPMENT FUND

- KDDF is **the Best Gateway** to license-in blockbuster drug candidates from Korea.
- KDDF's R&D pipeline comes from **multi-institutions** such as academia, hospitals, research institutions, biotech and pharmaceutical companies.
- The pipeline **covers all stage of drug development** from lead to clinical stage.
- KDDF's selection process and project management comply with global standard.





KDDF
Korea Drug Development Fund

CONTENTS

KDDF-201512-06

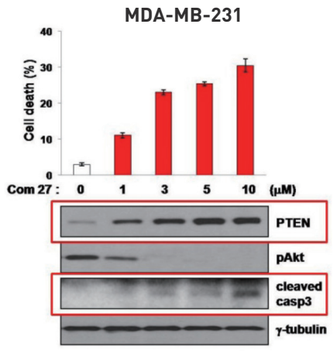
Chodang pharmaceuticals

CHODANG PHARM.

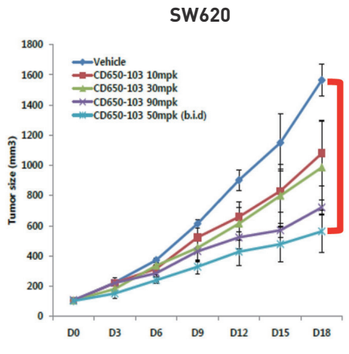
Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Human colon cancer
Target	PTEN
Concept	Inhibition of binding p34 to WW1 domain of NEDD4-1 → PTEN restoration/re-expression
Development status	Lead generation
Route of Administration	Oral
Competition	Other colon cancer medicine
Differentiation	Novel Target (First In Class potential) for colon cancer patients exhibiting the mutant KRAS (about 40%) or the wild KRAS not responsive to Erbitux treatment (about 30%)
Intellectual Property	Undisclosed (preparation)

Data



In vitro data



In vivo data

Project Milestone	Milestone 1: Lead generation (2017.05.31.) Milestone 2: Lead optimization (2019.12.31.)

www.chodang.co Heejong Lee leehj@chodang.com +82-2-2206- 3866

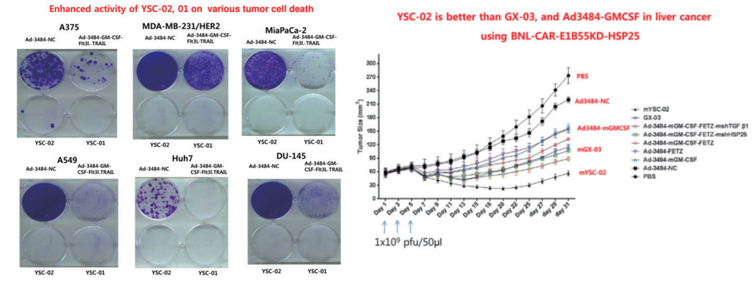
KDDF-201606-17

Yonsei University

Asset Overview

Product Type	Genetics (virus)
Therapeutic Area	Cancer
Target	TGF-β/HSP27
Concept	• Boosting anti-tumor immune responses by GM-CSF, Flt3L transgenes • Breakage of immune tolerance in tumor microenvironment and anti- angiogenesis, anti-invasion/metastasis by shTGF-β • Enhanced tumor-selective apoptosis by TRAIL • Decrease of survival potential acting as a sensitizer by shHSP27
Development status	Lead Generation
Route of Administration	Intratumoral
Competition	T-vec, JX-594
Differentiation	Best-in-class of on oncolytic viral therapeutics with both of tumor versatility and selectivity by combining of genes acting co-operatively
Intellectual Property	Priority application for Korea (10-2016-0166171) and PCT (PCT/KR2016/014325)

Data



Project Milestone	Milestone 1: Proof of Concept of efficacy of lead compound (2017.06.30.) Milestone 2: Optimization of lead compound (2018.08.31.)

http://sbsi.yuhs.ac/kor/people JaeJ . Song jjs109@yuhs.ac +82-2-2228-8037

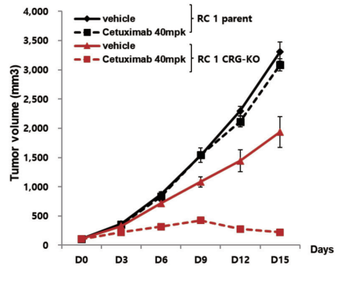
KDDF-201612-12

Wellmarkerbio Co., Ltd.

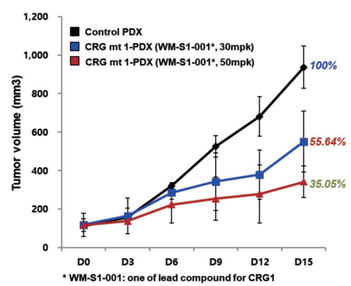
Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Colon Cancer (Oncology)
Target	CRG1 (Cetuximab-Resistant Gene 1)
Concept	Binding to CRG1
Development status	Lead Generation
Route of Administration	Oral
Competition	Other Cetuximab-resistant colon cancer medicine
Differentiation	Predictive biomarker for treatment of colon cancer Overcoming resistance of Cetuximab in treatment of colon cancer (First In Class potential)
Intellectual Property	Product Patent : 3 patents registered in Korea, 2 PCT filed Bio-Marker Patent : 1 patent filed in Korea, 1 PCT filed

Data



Target validation



Effect of CRG inhibitor

Project Milestone

Milestone 1: Lead generation / Chemical structure optimization (2018.12.31.)

Preparation Dong Hoon Jin inno183@amc.seoul.kr +82-2-3010-2643

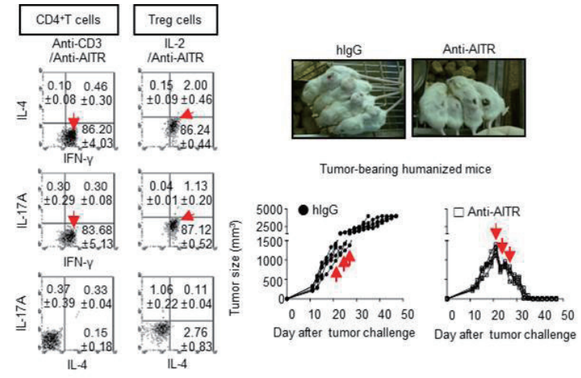
KDDF-201408-11

Eutilex Co., Ltd.

Asset Overview

Product Type	Protein (Antibody)
Therapeutic Area	Solid tumors
Target	AITR
Concept	AITR agonist → Th1 polarization and convert Treg into Th1 → Suppress cancers
Development status	Lead Optimization
Route of Administration	IV
Competition	Anti-AITR antibody (TOLERx, Merck, BMS)
Differentiation	Our AITR human antibody has the ability to convert Treg into Teff and induce IFN-gamma and can effectively suppress cancers (Best In Class)
Intellectual Property	Undisclosed (preparation)

Data



Project Milestone

Milestone 1: Proof of Concept (2018. 3Q)
Milestone 2: Preclinical study (2019. 3Q)

www.eutilex.com Agustin de la Calle adelacalle@eutilex.com +82-10-9892-3788

KDDF-201603-08

Abion. Inc

Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Gastric Cancer
Target	c-MET
Concept	Inhibition of the enzymatic activity of the c-MET tyrosine kinase → Dephosphorylation of the multiple docking site → Dephosphorylation of the downstream proteins
Development status	Lead Optimization / Preclinical
Route of Administration	Oral
Competition	Other c-MET inhibitor
Differentiation	Personalized Medicine (Best In Class potential)
Intellectual Property	PCT application: Korea, China, Europe, Japan, India and USA (Registrations of patents are submitted) New patents are under preparation

Data

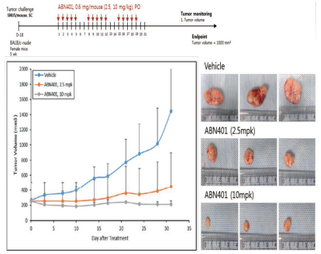


Fig.1 SNU5 Cell-line Derived Xenograft data

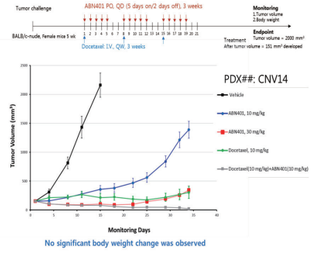


Fig.2 Patient Derived Xenograft data

Project Milestone

U. S. Food and Drug Administration (FDA) IND Approval (2018)

http://abionbio.com Eun Jin Kim ejkim@abionbio.com +82-2-6006-7615

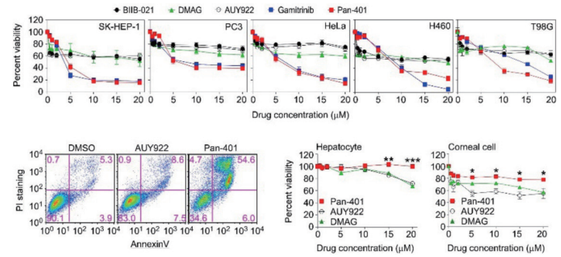
KDDF-201312-06

UNIST

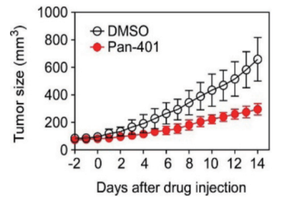
Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Cancer
Target	TRAP1
Concept	TRAP1 inhibition → Mitochondrial death program/metabolic dysfunction/ROS overproduction → Cell death
Development status	Preclinical
Route of Administration	Oral or IV
Competition	No drug with similar MOA
Differentiation	Novel Target, Novel MOA (First In Class)
Intellectual Property	Partially disclosed (preparation)

Data



Cytotoxic activity of Pan-401 in cancer cells



in vivo xenograft with PC3

Project Milestone

Milestone 1: ADME optimization (2018.03.31.)

https://sites.google.com/site/mitomed/ Byoung Heon Kang kangbh@unist.ac.kr +82-52-217-2521

KDDF-201606-15

Scripps Korea Antibody Institute

Asset Overview

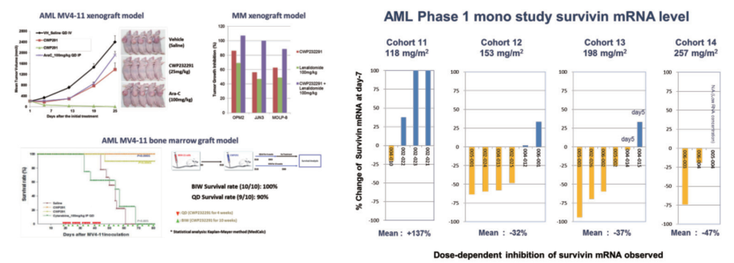
Product Type	Protein (Therapeutic Antibody)
Therapeutic Area	Metastatic Non-Small Cell Lung Cancer
Target	PD-L1
Concept	Various cancers have developed a unique mechanism to survive against our body's immune surveillance, one of which is based on the suppression of immune cell activities through immune checkpoints interaction, such as PD-1 and PD-L1 interaction between T cells and cancer cells respectively. By abrogating this PD-1 and PD-L1 interaction through anti-PD-L1 antibody, such as 'KL001', body's anti-cancer immune activity can be efficaciously re-activated and eradicate cancers even at very late stages. This therapeutic antibody can show such anti-cancer activity against diverse cancers, such as NSCLC, melanoma, H&N cancer, stomach cancer, etc.
Development status	Lead optimization and Cell-line development
Route of Administration	IV
Competition	Atezolizumab (Roche), Durvalumab (AstraZeneca), Avelumab (Merck Serono)
Differentiation	'KL001' has an unique binding epitope on PD-L1 and PD-L2
Intellectual Property	Undisclosed (in preparation) Unable to open experimental DATA because the patent for KL001 has not been filed yet
Data	Brief Description of KL001 1. 'KL001', anti-PD-L1 I/O therapeutic antibody was isolated through proprietary phage display screening from fully human antibody libraries 2. 'KL001' showed good PD-1/PD-L1 interaction blockade in SPR assay and in vitro cell-based assay 3. In vivo study using murine colon cancer MC38 & C57BL/6 syngeneic mouse model showed strong anti-cancer efficacy of 'KL001' 4. Physico-chemical druggable properties. Biodistribution, epitope mapping analysis and rodent tox study (multiple injection) also showed unique characteristics of 'KL001' 5. Affinity maturation study is at its final stage
Project Milestone	1. Finalization of preclinical candidate (2017.06.30.) 2. Production cell-line development

www.skai.or.kr Dae Hee Kim Ph.D. kimdh@skai.or.kr +82-33-250-8089

KDDF-201408-09

JW Pharmaceutical

Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Cancer (AML, MM)
Target	Wnt pathway
Concept	Wnt pathway inhibition by disrupting the unfolded protein response and inducing endoplasmic reticulum stress
Development status	Phase I
Route of Administration	IV
Competition	Other AML, MM drug
Differentiation	Novel target (First-in-class)
Intellectual Property	Worldwide IP 2028~2032
Data	
Project Milestone	AML P1 combo (+cytarabine) trial 2018. 2Q MM P1 mono, combo (+lenalidomide, dexamethasone) trial 2018. 2Q

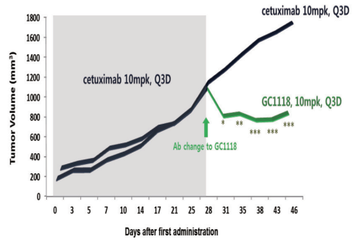
www.jw-pharma.co.kr Michael Kim jgkim@jw-pharma.co.kr +82-2-840-6811

KDDF-201412-08

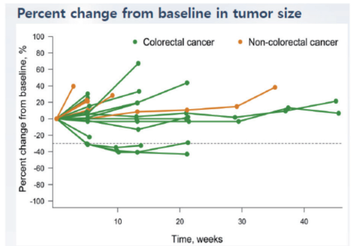
Green Cross Corporation

Asset Overview

Product Type	Protein (Antibody)
Therapeutic Area	Cancer
Target	EGFR
Concept	Different binding epitope/More efficient inhibition of EGFR ligand binding to EGFR esp. high-affinity ligands
Development status	Phase I (data clearing)
Route of Administration	IV
Competition	Mixtures of EGFR antibodies (Sym004, MM151)
Differentiation	Different (best in class potential)
Intellectual Property	WO2011/040668, WO2013/147509
Data	



Cetuximab-refractory model



Phase 1 dose escalation study

Project Milestone	Milestone 1: Safety, Tolerability, RP2D (2017.07.31.) Milestone 2: Proof of Concept (2020.06.30.)

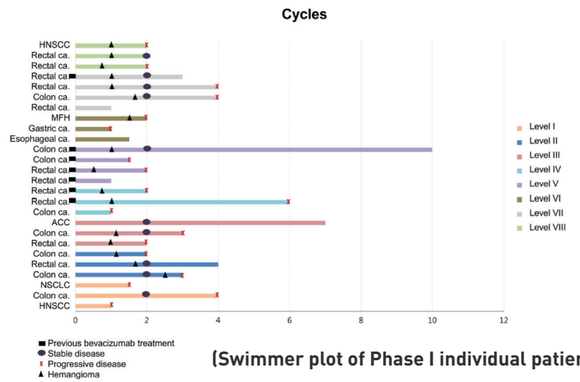
www.greencross.com Jiyoung Kim kimjy119@greencross.com +82-31-260-0845

KDDF-201509-07

PharmAbcine Inc.

Asset Overview

Product Type	Protein (Antibody)
Therapeutic Area	Glioblastoma Multiform (GBM)
Target	VEGFR-2 (KDR)
Concept	VEGF/VEGFR-2 signal inhibition → Inhibition of Cell Proliferation and Migration → Apoptosis of Tumor cells
Development status	Phase IIa in Australia
Route of Administration	IV
Competition	• Other VEGF or VEGFR-2 targeting medicines
Differentiation	• Safe in use : No side effects like hypertension, hemorrhage which are mostly common side effects in vascular targeting therapeutics • Interspecies cross reactivity: The only antibody therapeutics holding murine cross reactivity among VEGFR-2 targeting antibody • BIC mAb
Intellectual Property	Registered in 23 countries, including KR, US, JP, CN, EP, CA, AU etc.
Data	



(Swimmer plot of Phase I individual patient data)

Project Milestone	Milestone 1: Safety Evaluation in GBM Phase IIa patients (2016.12.) Milestone 2: Preliminary Efficacy Evaluation in GBM Phase IIa patients (2018.12.)

www.pharmabcine.com Sung-Woo Kim sungwoo.kim@gmail.com +82-10-6437-2454

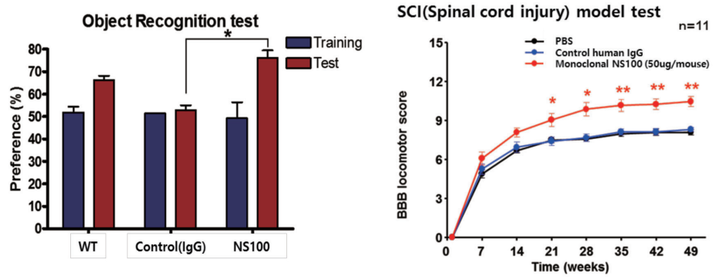
KDDF-201603-02

Neuracle Science, Co., Ltd.

Asset Overview

Product Type	Protein (Therapeutic Antibody)
Therapeutic Area	Alzheimer's disease
Target	Confidential
Concept	Inhibition of reactive gliosis
Development status	Lead Generation
Route of Administration	IV
Competition	Other AD medicine
Differentiation	Novel target (First-in-class)
Intellectual Property	Undisclosed

Data



Project Milestone

Lead generation (2017.09.31.)
Lead optimization (2018.09.31.)

Preparation Jeong, Jihyeon biochem@neuracles.com +82-2-6949-0409

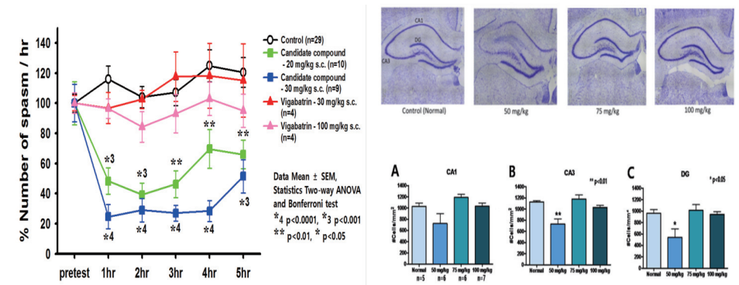
KDDF-201512-08

Bio-Pharm Solutions

Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Infantile Spasms (pediatric epilepsy)
Target	Metabotropic glutamate receptor family I & III
Concept	Inhibit glutamate release and de-inhibit GABA signaling → decrease risk of excitotoxicity
Development status	Preparing for Phase I/II
Route of Administration	Oral
Competition	Vigabatrin/ACTH
Differentiation	Novel MoA with anticonvulsant, anti-epileptogenesis and Neuroprotection (Best in Class potential)
Intellectual Property	Registered: JP6062077, KR10-1717872 PCT: KR2014-001903

Data



A) Efficacy in Symptomatic infantile spasms rat pup model

B) Protect hippocampal neurons against benzodiazepine-resistant status epilepticus in adult rats

Project Milestone

Milestone 1: Update nonclinical data, (2016.04-2017.06.)
Milestone 2: Preparing for IND submission, (2017.07-2018.09.)

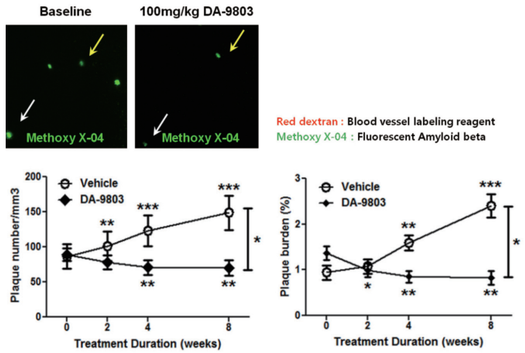
Preparation Yongho Kwak yongho.kwak@gmail.com +82-31-888-9636

KDDF-20160603-03

Dong-A ST

Asset Overview

Product Type	Botanical drug
Therapeutic Area	Alzheimer's Disease
Target	Multi-Target (Aβ, Tau, AChE)
Concept	1) Disease-treating via removal of disease-causing source Aβ (Neprilysin) ptau(GSK-3β) 2) Improving cognitive ability via AChE inhibition 3) Neuroprotection via NGF
Development status	Pre-Clinical
Route of Administration	Oral
Competition	Aβ antibody and/or AChE inhibitor
Differentiation	Multi-function (Disease modifying and symptomatic effects)
Intellectual Property	PCT/KR-2015-013134, PCT/KR2015/013136
Data	Amyloid beta research (Brain of APP/PS1 mouse)



〈 Preclinical research results with Harvard Univ. 〉

Project Milestone	1. FDA Phase 1b or 2a IND filing & submission (2017. 4Q) 2. US clinical initiation and clinical completion (2018. 2Q ~ 2019. 4Q)

www.donga-st.com Lee, Hyangsoo hlee@donga.co.kr +82-31-282-1397

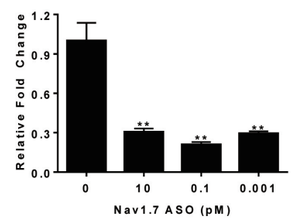
KDDF-201606-18

OliPass Corporation

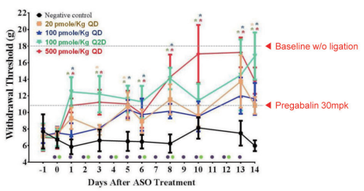
we create breakthru medicines

Asset Overview

Product Type	Chemical (OliPass Oligonucleotide)
Therapeutic Area	Neuropathic Pain
Target	SCN9A / Nav1.7
Concept	OLP-1002 selectively binds to SCN9A pre-mRNA → Induce Exon Skipping of SCN9A pre-mRNA → Inhibition of Translation of Nav1.7 → Inhibition of Nav1.7 Expression → Reproduce Pharmacological Phenotypes of SCN9A Channelopathy
Development status	Preclinical
Route of Administration	Subcutaneous
Competition	Small molecule Nav1.7 selective inhibitors—Found to show poor analgesic activity in human subjects.
Differentiation	Novel Target (First In Class Potential) - OLP-1002 possesses an extremely high selectivity for Nav1.7 over Nav1.5, and distributes well to CNS tissues. - Therapeutic dose of OLP-1002 is predicted to be as small as 10 to 20 mg per week in patients with chronic neuropathic pains, which may be developed for an readily affordable annual treatment cost.
Intellectual Property	PCT/KR2009/001256 OLP-1002 is a derivative of OliPass Oligonucleotide, a novel class of oligonucleotide which was developed by rationally modifying PNA to possess good membrane permeability as well as ultra strong affinity for nucleic acid.
Data	



SCN9A mRNA Level



SCN9A ASO – In Vivo

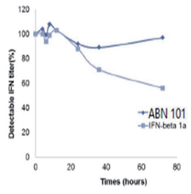
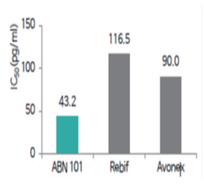
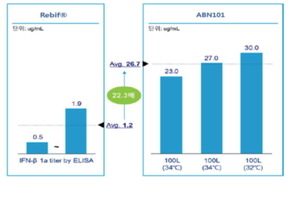
Project Milestone	IND approval in Europe (2018.03.)

www.OliPass.com Hanyong Lee hylee@olipass.com +82-31-8060-8202

KDDF-201502-07

Abion. Inc

Asset Overview

Product Type	Protein
Therapeutic Area	Multiple Sclerosis
Target	The next generation Biobetter version of the human Interferon-beta through glycoengineering
Concept	Immune modulation
Development status	Process Development / Preclinical
Route of Administration	SC
Competition	Merck Serono (Rebif), Biogen IDEC (Avonex).
Differentiation	• Decrease of aggregation tendency with additional glycosylation • Improvement of solubility and stability • Price rationalization through improved productivity • Increase of in-vivo half-life and activity • Possibility of use in the off-label market, such as to treat viral disease
Intellectual Property	• Human Interferon-beta Mutein (BR, CN, EP, IN, JP, KR, PCT, US) • Modified Interferon-beta Conjugated with Polyethylene Glycol (KR, PCT) • Stabilized Formulations of Interferon beta Mutant (KR, PCT) • Immunocytokine Conjugated with Human Interferon Beta-mutein and Method for Preparing Thereof (KR, PCT)
Data	 **Figure 1.** Aggregation propensity  **Fiure 2.** Anti-proliferation effect  **Figure 3.** Cell line productivity
Project Milestone	European Medicines Agency (EMA) approved (2023)

http://abionbio.com Kyoung Song sk17@abionbio.com +82-2-6006-7631

KDDF-201512-08

JEIL Pharmaceutical Co., Ltd.

Asset Overview

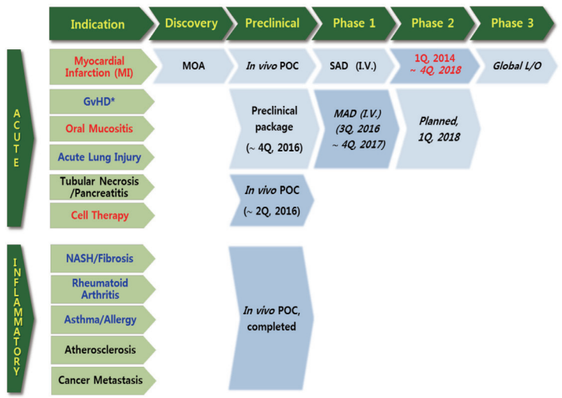
Product Type	New Chemical Entity
Therapeutic Area	Acute Ischemic Stroke
Target	PARP-1
Concept	Reperfusion of stroke patient → PARP-1 over-activation → PARP-1 inhibition → Reducing damages caused by necrosis and apoptosis → Neuroprotective effect
Development status	Phase II
Route of Administration	IV bolus + Infusion
Competition	MP-124 of Mitsubishi Tanabe
Differentiation	Novel Target (First in Class and Best in Class potential)
Intellectual Property	1. Patent applications covering materials and preparation methods were submitted in 2009, and the registration was approved in 2010 in Korea (10-0968175), as well as in the US, Europe, China, Japan, Australia, Canada, Russia, Mexico, and Hong Kong. - PCT: WO 2010/056038 2. Application for the JPI-289 crystalline structure patent was submitted in 2012, and the registration was approved in the US and Russia. 3. In summary, one application in Korea and 12 international applications have been registered, and review processes for registration of another application in Korea and 4 international applications are currently underway.
Data	1. Ongoing Phase 2 (Clinical POC Study): Phase 1 completed in 2015 Clinical trials (Korea): NCT #02396069 64 subjects No SAEs, MTD = 900 mg/day 2. Monkey tMCAO model study: IV infusion for 1 h The best results in the world compared to those of competitors
Project Milestone	Milestone 1: Proof of Concept (2018.03.31.)

www.jeilpharm.co.kr Jeong-Min Kim jminkim@jeilpharm.co.kr +82-31-332-4457 (Ext. 772)

KDDF-201210-07

LG Chem

Asset Overview

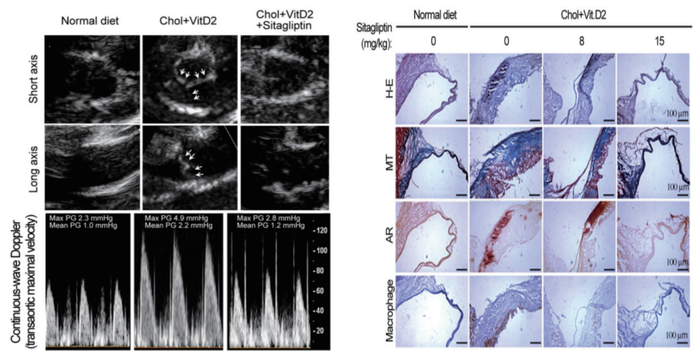
Product Type	New Chemical Entity
Therapeutic Area	(1) Cardiac ischemia-reperfusion injury (i.e. AMI) (2) Autoimmune & inflammatory diseases (3) Mitochondrial (rare) diseases
Target	Mitochondrial ROS
Concept	(1) A mitochondria-targeted ROS scavenger (2) A novel necrosis inhibitor (3) A mPTP modulator (indirect)
Development status	Phase II (STEMI patients with AMI)
Route of Administration	IV (orally available)
Competition	No competition (all clinical trials failed)
Differentiation	(1) A novel necrosis inhibitor (First In Class potential) (2) Downregulation of RIP-1 & -3 expression (necroptois inhibition)
Intellectual Property	10 PCTs
Data	
Project Milestone	The interim data of Phase 2a will be available at the end of 2017

www.lgchem.com Soon-Ha Kim shakim@lgchem.com +82-10-7755-0235

KDDF-201609-12

Ulsan University

Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Calcific aortic valve disease (CAVD)
Target	Dipeptidyl peptidase-4 (DPP-4)
Concept	DPP-4 inhibition → Reduction of aortic valve calcification → Attenuation of CAVD development
Development status	Lead Optimization
Route of Administration	Oral
Competition	None
Differentiation	Novel Target (First In Class potential)
Intellectual Property	Undisclosed (preparation)
Data	
Project Milestone	Milestone 1: Drug Repositioning of DPP-4 inhibitor for CAVD treatment (2019.01.31.)

www.ails.amc.seoul.kr Jae-Kwan Song jksong@amc.seoul.kr +82-2-3010-3155

KDDF-201601-03

Gwangju Institute of Science and Technology

Asset Overview

Product Type New Chemical Entity

Therapeutic Area Diabetes and Cancer

Target PDK4 (pyruvate dehydrogenase kinase4)

Concept PDK inhibition → Control PDC (Pyruvate dehydrogenase complex) activity → Control Glucose utilization

Development status Lead Generation

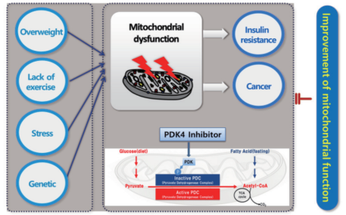
Route of Administration Oral or Injection

Competition Other T2DM medicine

Differentiation Novel Target (First In Class potential)

Intellectual Property Undisclosed (preparation)

Data



PDK4 inhibitor

	PDK4 IC50	M.S. After 30 min	Solubility (u SOL)	Herg % Inhibition at 10 uM	CYP450-F % Inhibition at 10 uM	PK (iv and oral)	In vivo study (7 days)
KR67419	1759 nM	98% (rat) 99% (human)	>250 ug/ml	2.12%	1A2 : <1 2C9 : 13.70 2C19 : 6.15 2D6 : 3.43 3A4 : 5.12	BA 11%	
GM10076	587 nM	66% (rat) 74% (human)		2.93%	1A2 : <1 2C9 : 56.4 2C19 : 27.6 2D6 : 3.08 3A4 : 18.1	BA 19%	
GM10002	75 nM	99% (mouse) 99% (human)				pending	Glucose lowering efficacy
GM10136	93 nM	99% (mouse) 99% (human)				pending	Glucose lowering efficacy

Data

Project Milestone Milestone 1: Lead generation (2017.12.31.)

sites.google.com/site/medichemgist1 Jin Hee Ahn (Ph.D. Professor) jhahn@gist.ac.kr +82-62-715-4621

KDDF-201601-01

Ewha Womans University

Asset Overview

Product Type New Chemical Entity

Therapeutic Area Diabetes Mellitus, Type 2 (Metabolic Disease)
NASH

Target Gut-restricted Farnesoid X Receptor (FXR)

Concept Gut-restricted FXR agonism → Enhancing GLP-1 signaling & energy expenditure, reducing serum inflammatory cytokines, altering serum bile acid composition & gut microbiome → Reducing blood glucose levels & diet-induced weight gain, improving metabolic syndromes

Development status Lead Generation

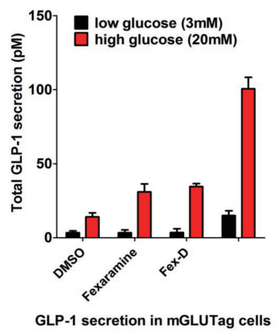
Route of Administration Oral

Competition Other T2DM medicines

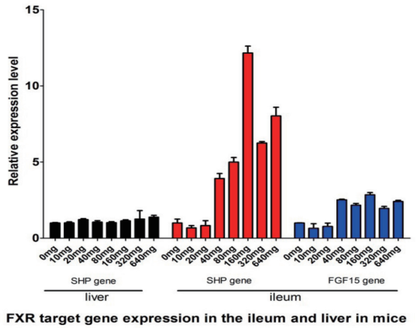
Differentiation Gut-restricted FXR Modulator (First In Class potential)

Intellectual Property Undisclosed (preparation)

Data



GLP-1 secretion in mGLUTag cells



FXR target gene expression in the ileum and liver in mice

Project Milestone Milestone 1: Proof of Concept/Lead Generation (2017.07.15.)
Milestone 2: Chemical structure Optimization (2019.01.15.)

www.ewha.ac.kr Dae-Kee Kim dkkim@ewha.ac.kr +82-10-5223-8122

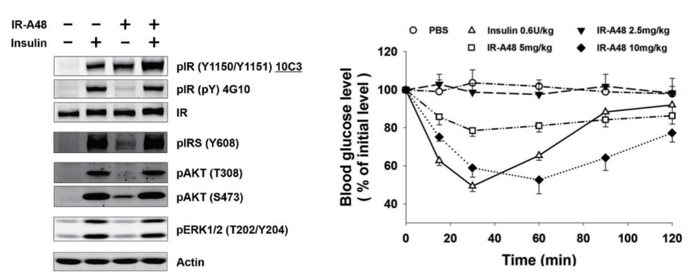
KDDF-201601-04

Aptamer Sciences Inc.

Asset Overview

Product Type	Chemical (Aptamer)
Therapeutic Area	Diabetes Mellitus, Type 2 (Metabolic Disease)
Target	Insulin Receptor
Concept	Allosteric activation of Insulin Receptor → Biased Function (Blood glucose control without mitogenic activity)
Development status	Lead Optimization
Route of Administration	SC
Competition	Insulin Analogues (Basal insulin)
Differentiation	Novel mechanism of action without side effect (First in class)
Intellectual Property	Undisclosed (preparation)

Data



Project Milestone Milestone 1: Chemical optimization (2018.06.08.)

www.aptsci.com Youndong Kim youndong@aptsci.com +82-31-786-0082

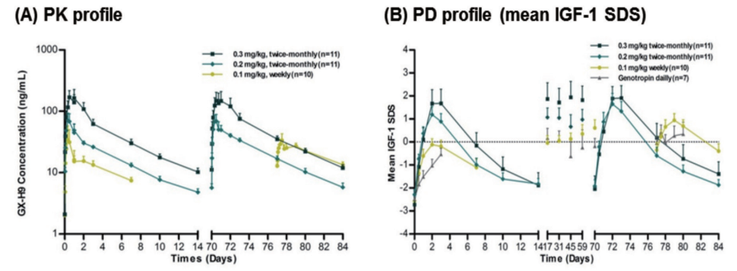
KDDF-201502-11

Genexine, Inc.

Asset Overview

Product Type	GX-H9 (Hybrid Fc fusion human growth hormone)
Therapeutic Area	Growth hormone deficiency
Target	Growth hormone deficiency in Adult
Concept	Developing long-acting growth hormone to ensure compliance, convenience and safety
Development status	Global Phase II (In-process of completion)
Route of Administration	SC injection (liquid)
Competition	Opko (L/O to Pfizer), Versartis, Novo Nordisk, Ascendis
Differentiation	Twice-monthly and weekly doses and improved safety profile
Intellectual Property	US 8,586,038; US 8,586,048; US 8,586,531; US 8,529,899; KR 1 380729; KR 1 380732

Data



Project Milestone Project ends in 2017.06.

www.genexine.com Jin J. Lim jj.lim@genexine.com +82-31-628-3352

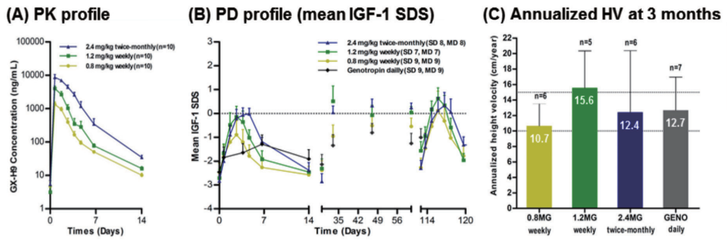
KDDF-201509-12

Genexine, Inc.

Asset Overview

Product Type	GX-H9 (Hybrid Fc fusion human growth hormone)
Therapeutic Area	Growth hormone deficiency
Target	Growth hormone deficiency in pediatric population
Concept	Developing long-acting growth hormone to ensure compliance, convenience and safety
Development status	Global Phase II (Complete recruitment)
Route of Administration	SC injection (liquid)
Competition	Opko (L/O to Pfizer), Versartis, Novo Nordisk, Ascendis
Differentiation	Twice-monthly and weekly doses and improved safety profile
Intellectual Property	US 8,586,038; US 8,586,048; US 8,586,531; US 8,529,899; KR 1 380729; KR 1 380732

Data



Project Milestone

Milestone 1: 6 month aHV result (2017.04.)
Milestone 2: License out (2017.10.)

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KDDF-201404-10

CJ HealthCare

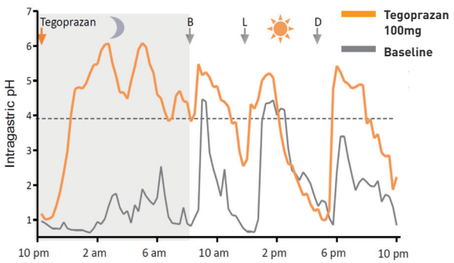
Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Acid-related diseases (GERD, Peptic ulcer, and H.pyloriinfection)
Target	Gastric Protonpump (H^+/ K^+ ATPase)
Concept	P-CABs inhibit gastric H^+/K^+-ATPase in a K^+competitive but reversible mechanism. Consequently, P-CABs do not require prior proton pump activation to achieve their anti-secretory effect. P-CABs exhibit an early onset of acid-secretion inhibition due to rapid rise in peak plasma concentration, resulting in quicker symptom relief and healing.
Development status	Phase 3 for GERD is completed
Route of Administration	Oral / Tablet / QD
Competition	PPIhas identifiable limitations related to mechanismof action. It requires several days to achieve maximum suppression, is less efficacious when administered post-prandially, and has large individual differences inefficacy. Tegoprazancan satisfy these unmet needs in gastric-acid related diseases, which are notaddressed by PPI.
Differentiation	Best-in class P-CAB
Intellectual Property	Undisclosed (preparation)

Data

Assay	Stomach	IC_{50}(uM)
H^+/K^+-ATPase	Human	0.52
	Porcine:	0.47
	Canine:	0.29
Na^+/K^+-ATPase	Canine:	>100

In vitro Pharmacology



Clinical Study

Project Milestone

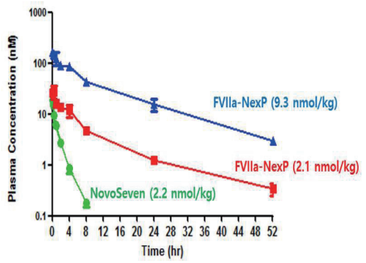
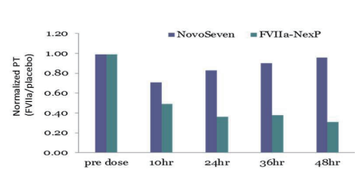
NDA submission in 2017

www.cjp.co.kr Park, Byung Chul bc.park77@cj.net +82-31-639-4317

KDDF-201606-02

Alteogen, Inc.

Asset Overview

Product Type	Protein
Therapeutic Area	Hemophilia
Target	Coagulation Factor VIIa
Concept	Recombinant FVIIa + NexP™ → Long-acting FVIIa
Development status	Lead Optimization
Route of Administration	IV
Competition	FVIIa-FP (albumin fusion), FVIIa-CTP (CTP fusion)
Differentiation	Prolonged half-life with equivalent effects (Best In Class potential)
Intellectual Property	US patent No. 9012606 (registered; application date: 2011.10.21)
Data	 

NovoSeven/ FVIIa-NexP(%)	100	145	231	237	310

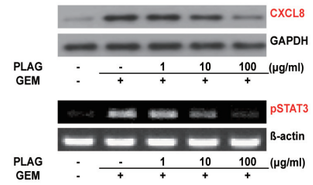
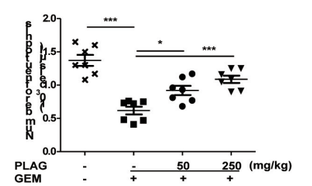
Project Milestone	Milestone 1: Proof of concept in hemophilia mice (2017.09.30.) Milestone 2: Starting of preclinical study (2017.12.31.)

www.alteogen.com J.Ko jhko@alteogen.com +82-42-867-8785

KDDF-201606-08

ENZYCHEM LIFESICENCES

Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Neutropenia (Febrile)
Target	STAT3
Concept	Inhibition of phosphorylation of STAT3 → Decrease of production of CXCL8 → Decrease of neutrophils mobility → Decrease of neutrophils extravasation
Development status	Phase II
Route of Administration	Oral
Competition	IV-infusible/SC-injectable recombinant myeloid growth factors
Differentiation	Novel MOA/Oral route (FIC)
Intellectual Property	Undisclosed (preparation)
Data	 **Figure 1. PLAG concentration-dependent effects of PLAG on phosphorylation of STAT3 (up) and mRNA levels of CXCL8 (down) in cells treated with or without gemcitabine (GEM)**  **Figure 2. PLAG concentration-dependent increase of PLAG on number of neutrophils in Balb/c mice treated with or without gemcitabine (GEM)**
Project Milestone	Milestone 1: Clinical Proof of Concept (2018.10.)

www.enzychem.com Soyoun Ahn sahn@enzychem.com 82-2-6213-7120

KDDF-201609-01

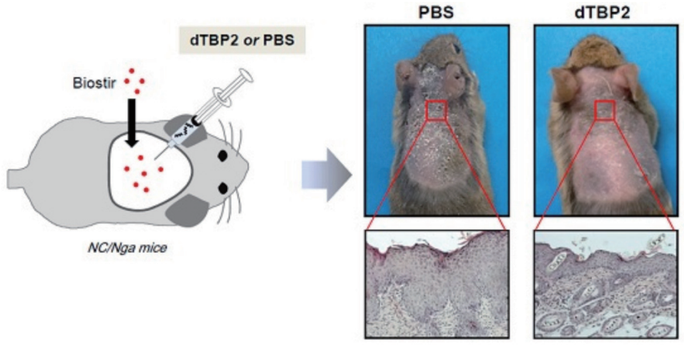
Ewha Womans University

EWHA WOMANS UNIVERSITY

Asset Overview

Product Type	Peptide
Therapeutic Area	Atopic dermatitis
Target	Histamine Releasing Factor (HRF)
Concept	HRF inhibiting peptide (dTBP2) → HRF inhibition → Targeted therapy for atopic dermatitis
Development status	Lead Generation
Route of Administration	Subcutaneous
Competition	Dexamethasone (a corticosteroid)
Differentiation	Novel Target (First In Class potential)
Intellectual Property	Undisclosed (preparation)

Data



Project Milestone Milestone 1: Proof of Concept (2018.04.15.)

http://home.ewha.ac.kr/~pharm21/ Kyunglim Lee klyoon@ewha.ac.kr +82-2-3277-3024

KDDF-201410-02

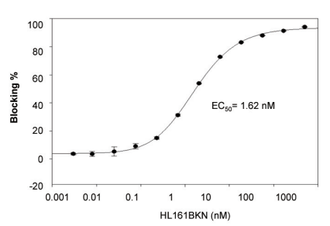
HanAll BioPharma

HANALL BIOPHARMA

Asset Overview

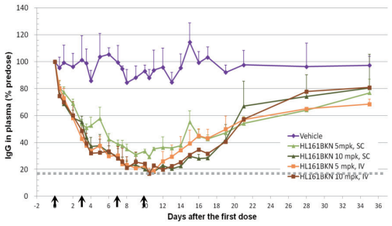
Product Type	Protein (Fully Human Monoclonal Antibody)
Therapeutic Area	Pathogenic IgG-Mediated Autoimmune Diseases
Target	Human FcRn
Concept	hFcRn blocking → Inhibition of hIgG binding to hFcRn → Reducing pathogenic IgG level → Disease recovery
Development status	IND-ready
Route of Administration	SC Injection
Competition	Other anti-FcRn antibody drug
Differentiation	High potency & Patient compliance based on SC injectable formulation (First-in-Class Potential)
Intellectual Property	PCT/KR15/04424

Data



〈 Inhibition of hIgG binding to hFcRn〉

- FACS competitive binding assay with hFcRn-expressing HEK293 cells at pH6.0



〈 PK/PD Study in cynomolgus monkey〉

- IgG levels were reduced to about 80% of baseline at both idoses of 5 mg/kg and 10 mg/kg

Project Milestone Milestone 1: Candidate Development & non-clinical study (2017.06.30.)

www.hanall.co.kr Minjae Shin Emptymj@hanall.co.kr +1-301-655-8569

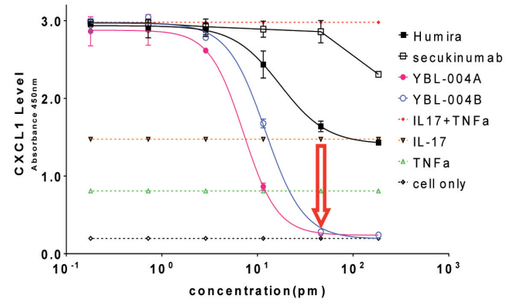
KDDF-201606-04
Y-Biologics

Asset Overview

Product Type	Protein (bi-specific antibody)
Therapeutic Area	Auto-inflammatory & auto-immune disease
Target	TNF-alpha & IL-17
Concept	Neutralizing TNF-alpha & IL-17 in same time
Development status	Cell line development
Route of Administration	SC / IV
Competition	TNF-alpha blockade & anti-TNF-alpha & anti-IL-17 bispecific antibody
Differentiation	Biobetter of TNF-alpha blockade (better response rate & Disease modifying), targeting IL-17 driven disease segment
Intellectual Property	Undisclosed (preparation)

Data

TNFα /IL17A-CXCL1 inhibition



- **YBL-004 : Full-IgG(Humira)-scFv (anti-IL17) form**
- **IL-17 antibody**

- Fully human antibody
- Highly IL-17A specific (no binding to IL-17F)
- Creactive to marmoset and cynomolgous Il-17A
- 10^{-11} KD value
- Highly stable

Project Milestone Milestone 1: primary CMC & pretoxicity study (2018.03.08.)

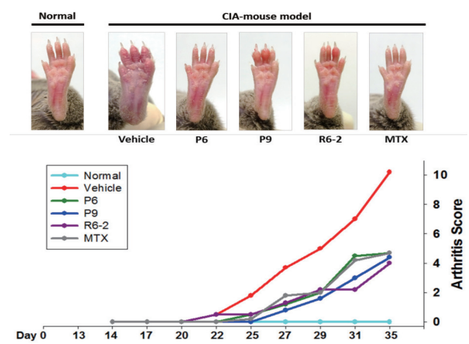
www.ybiologics.com Young-Gyu Cho Yonggyucho@ybiologics.com +82-42-716-4979

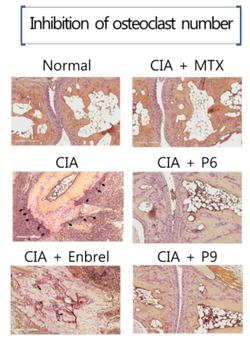
KDDF-201612-09
Sookmyung Women's University

Asset Overview

Product Type	Peptides
Therapeutic Area	Rheumatoid Arthritis (RA)
Target	Regulatory T cells (Treg)
Concept	Increased Treg cell number and activity → Inhibition of Th17 cells and Osteoclast differentiation → Suppression of RA pathogenesis
Development status	Lead Optimization
Route of Administration	IV or SC
Competition	TNF inhibitors
Differentiation	Novel small peptide from Erdr1 protein (first-in-class) Specific target identification for each peptides
Intellectual Property	PCT applications

Data





Project Milestone Milestone1: Lead optimization → Candidate selection

http://snowe.sookmyung.ac.kr/club/cdhkor Prof. Daeho Cho
cdhkor@sookmyung.ac.kr +82-2-710-9416

KDDF-201509-05

Oscotec Inc.

Asset Overview

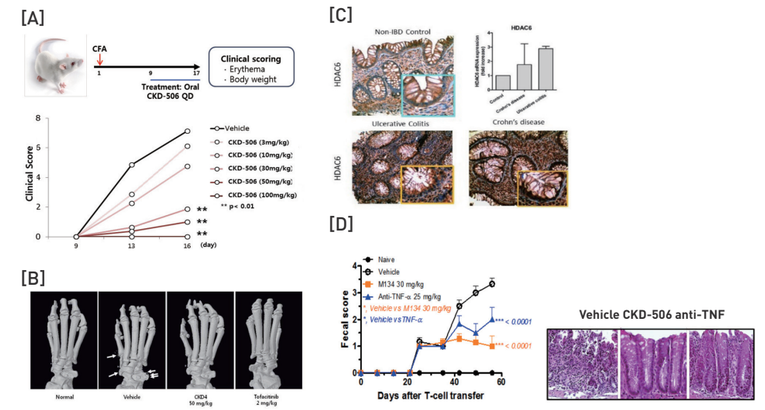
Product Type	Chemical
Therapeutic Area	Rheumatoid arthritis
Target	Spleen tyrosine kinase
Concept	Spleen tyrosine kianse (SYK) is involved in regulating leukocyte immune function. Aberrant SYK activation is associated with diverse allergic disorders and antibody-mediated autoimmune diseases such as RA, asthma, and allergic rhinitis. SKI-O-703 inhibits SYK.
Development status	Phase I
Route of Administration	Oral
Competition	Fostamatinib (R788) developed by Rigel Pharmaceuticals, Inc. jointly with AstraZeneca was discontinued after Phase III clinical trials due to low efficacy and severe adverse events which were caused from low selectivity. P505-15, from Portola Pharmaceuticals Inc. exhibited high selectivity, but revealed a high level of toxicity and low bioavailability.
Differentiation	Our clinical candidate SKI-O-703 demonstrated a superior selectivity to SYK, an improved bioavailability and a low level of toxicity. It has been established from in vivo models that SKI-O-703 has better efficacy and safety characteristics when compared to existing SYK inhibitors. (First/Best in class)
Intellectual Property	PCT/US patents filed and national phases applied
Data	• Single ascending dose (SAD) study : completed - Clinical safety (50 to 800 mg oral qd dosing) : no outstanding issue found at any test dose and no other significant findings, including vital signs, ECG and laboratory tests (hematology, serum chemistry, urinalysis) - Strong PD effect in activated basophil followed by anti-IgE stimulation Estimated EC50 of SKI-O-703, ~350 nM in the % activated basophil • Multiple ascending dose (MAD) study : completed (preparing the CSR) - 200 mg (qd & bid) and 400 mg (qd): completed at Q2, 2017 - Clinical safety : no outstanding issue found at any test dose - Reproducible PD effect in activated basophil followed by anti-IgE stimulation
Project Milestone	Milestone 1: Completion of SAD study (2016.10.07.) Milestone 2 : Completion of MAD study (2017.11.07.)

www.oscotec.com Jung-Ho Kim jhkim@oscotecc.com +82-31-628-7666

KDDF-201609-04

Chong Kun Dang

Asset Overview

Product Type	New Chemical entity
Therapeutic Area	Autoimmune Disease (RA, IBD)
Target	Histone Deacetylation 6 (HDAC6)
Concept	Inhibits TNF alpha and regulates T cell function
Development status	Phase I
Route of Administration	Oral
Competition	Chemical and biological DMARDs
Differentiation	Novel Target (First-in-Class)
Intellectual Property	The patent of CKD-506 was granted in Korea on July 2016, and filed in 53(fifty-three) countries on April 2014
Data	

CKD-506 in autoimmune diseases. (A) CKD-506 represses arthritis in rat AIA model. (B) CKD-506 prevents bone deformation in rat AIA. (C) HDAC is overexpression in colon tissues of ulcerative colitis and Crohn's diseases patients. (D) CKD-506 represses diseases activity in $CD4^{+}CD45RB^{hi}$ T cell adaptive transfer model and preserves IBD epithelium.

Project Milestone	Phase I: SAD, FE, MAD (2017. 3Q)

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KDDF-201406-08

ImmuneMed, Inc.

Asset Overview

Product Type	Protein (Immunoglobulin)
Therapeutic Area	Infectious disease (HBV, Influenza, etc)
Target	Virus Suppressing Factor (VSF) receptor
Concept	Virus infection → Anti VSF receptor expression only on virus infected cells → VSF treatment → anti-viral and anti-inflammatory effects to cell
Development status	Preclinical to Phase I (expected to 2017)
Route of Administration	IV/ IM
Competition	It works a different mechanism of action compared to conventional anti-viral treatments. No competition
Differentiation	Novel target (FIC)
Intellectual Property	Undisclosed (preparation)

Data

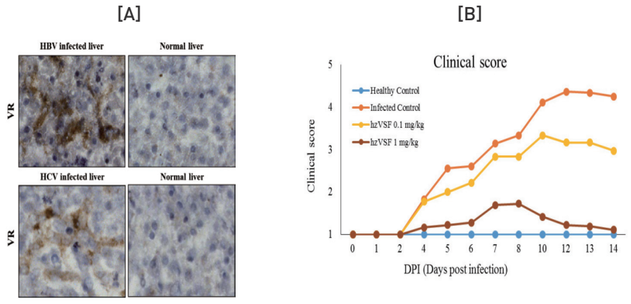

Figure 1. Examination of VSF receptor (VR) in HBV and HCV infected human liver tissue (A) and clinical score of influenza A (H1N1) infected mice after hzVSF treatment (B)

Project Milestone

Milestone 1: Lead optimization (2016.02.28.)
Milestone 2: Preclinical toxicology and efficacy test (2017.02.28.)

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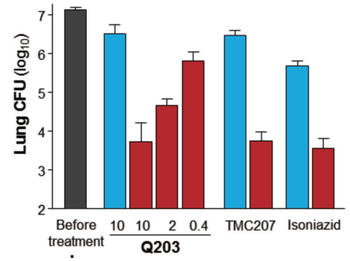
KDDF-201509-02

Qurient

Asset Overview

Product Type	New Chemical Entity
Therapeutic Area	Tuberculosis
Target	Inhibition of cytochrome bc1 complex QcrB subunit in TB
Concept	Cytochrome bc1 complex inhibition → Inhibition of energy metabolism in TB → Bactericidal effect
Development status	Phase I
Route of Administration	Oral
Competition	TB drugs are used in combination to take advantage of synergistic effect, yet preventing resistance. There is no competition in this class of compound
Differentiation	First in class compound
Intellectual Property	Undisclosed (preparation)

Data



- Strong efficacy in an established mouse TB model. CFUs were enumerated in the lung of infected animals after 14 days (blue bars) and 28 days (red bars) of treatment (Q203: 10, 2, 0.4 mg/kg TMC207: 6.5 mg/kg Isoniazid: 15 mg/kg)
- Strong efficacy against 13 MDR & 15 XDR clinical isolates

Project Milestone

End of Phase 1 study: 2017
End of phase 2A study: 2018

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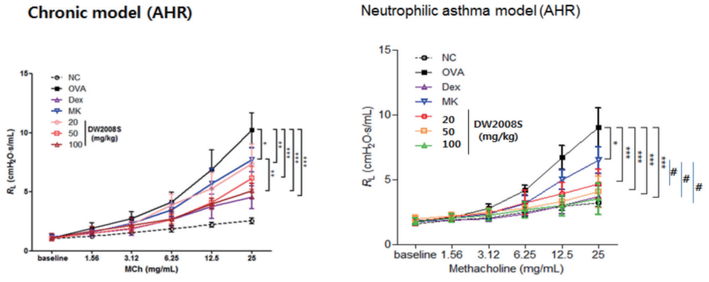
KDDF-201512-03

Dong-wha pharm. Co.

Asset Overview

Product Type	Botanical, Herbal medicine
Therapeutic Area	Allergic asthma
Target	Multi-targets (4 targets identification)
Concept	Mutli-targeting relating to allergy → Th2/Th17 selective blockade → Reduction of allergic response
Development status	Preclinical
Route of Administration	Oral (QD)
Competition	Singulair (Montelukast, Leukotriene receptor antagonist)
Differentiation	Superior efficacy to montelukast , Novel targets (First In Class)
Intellectual Property	Patent pending: Korea (2), PCT(2)

Data



Project Milestone	Clinical IND approval. (2018.03.30.)

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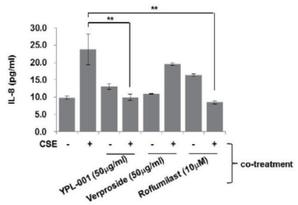
KDDF-201410-05

YUNGJIN PHARM. CO., LTD.

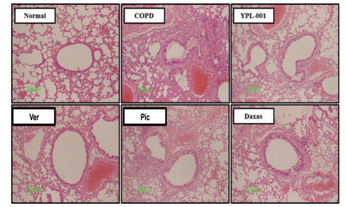
Asset Overview

Product Type	Botanical Drug / NCE
Therapeutic Area	COPD (Respiratory System)
Target	HDAC2
Concept	HDAC2 activator → Inflammation controls and increasing of steroids sensitivity → Prevention of COPD exacerbation
Development status	Phase IIa Completion (CSR working)
Route of Administration	Oral
Competition	Oral COPD medicines
Differentiation	Novel Target (First In Class potential)
Intellectual Property	Patient 1: Registered, Covering world wide (15 countries) Patient 2: Registered, Covering world wide (12 countries) Patient 3: Registered, Covering world wide (12 countries) Patient 4: Registered, Covering world wide (12 countries) Patient 5: Registered, Covering world wide (12 countries) Patient 6: Registered, Covering world wide (12 countries)

Data



[A] In Vitro (human BEAS-2B cell)



[B] In Vivo (CSE mouse acute model)

- **Model:** 6 ~ 8 weeks old male BALF/c mouse (n = 8/group)
- **Inducer:** LPS 100 μg/mL + CSE(Cigarette Smoke Extract) 4 mg/mL
- **Dosing:** YPL-001, Daxas, Ver(Active 1), and Pic(Active 2) (30 mg/kg)

Project Milestone	Milestone 1: FDA Phase IIa completion (2017.10.31.) Milestone 2: MFDS Phase IIb submission (2018.03.31.)

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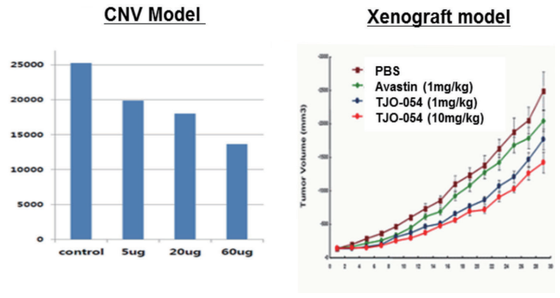
KDDF-201509-15

Taejoon Pharmaceutical Co., Ltd.

Asset Overview

Product Type	Protein (Antibody)
Therapeutic Area	Wet AMD
Target	VEGFR2
Concept	VEGFR2-specific binding → Blocking not only VEGF-A, but as well as VEGF-C and VEGF-D
Development status	Preclinical
Route of Administration	Intravitreal injection
Competition	Lucentis, Eylea
Differentiation	Potential to treat tachyphylaxis against Lucentis or Eylea by Inhibiting VEGFR2 signaling of VEGF-C and VEGF-D
Intellectual Property	Disclosed
Data	
Project Milestone	Approval of Ph1 IND (2018.09.)

http://www.taejoon.co.kr/en/ Dong-Hyeon Kim kimdh@taejoon.co.kr +82-2-799-0160

WHY "KOREA" IS THE PERFECT PLACE FOR NEW DRUG DEVELOPMENT

GEOGRAPHICAL ADVANTAGE

Korea is strategically located at the center for transportation in Northeast Asia

- 61 cities with a population of more than 1 million within a 3-hour flight from Seoul
- Korea, Japan and China boast a combined GDP of about $14 trillion
- Total population of Korea, Japan and China exceeds 1.52 billion, or 22% of the global population, and total trade volume is $5.32 trillion, or 17.6% of total world trade.
- Established the APEC Harmonization Center (AHC) for regulatory harmonization within ICH guideline.
- Efforts for Regulatory Harmonization across Korea, China, Japan – Established AHC(www.apec-ahc.org) and holds tripartite forum to elicit the right policy environment for life sciences innovation.

GOVERNMENT INITIATIVES

The government selected the bio industry as a new growth engine and launched various initiatives to support pharmaceutical industries

- Government Initiative for Drug Development : The government of the Republic of Korea launched the Korea Drug Development Fund (KDDF) in 2011 to transform Korea into the global leader for new drug development with a budget of US$1 billion.
- State-of–the-art Infrastructures : Korea National Enterprise for Clinical Trials (KoNECT), Korea Research Institute of Bioscience & Biotechnology (KRIBB), Korea Institute of Technology (KIT), Korea Research Institute of Chemical Technology (KRICT), Two high-tech medical clusters (Osong, Daegu)

EXCELLENCE IN PHARMACEUTICAL R&D

Korea has strong human capital & research capability

- Large pool of R&D experts : 22,817 workers in the bio industry (36.7% of them having master's or doctor's degrees)
- Strong Competitiveness in Basic Research
  - 28 Korean researchers' papers related to biotechnology published in the top 3 global science magazines (Nature, Science, Cell)
  - Ranked 5th for number of patents (9,689 patents Statistics from the World Intellectual Property Organization in 2010)
  - Registered 520 patents in the bio sector of the United States between 2006 and 2010, and recorded 166 in technology strength, ranking 14th.