New Drug Development and the Regulatory Environment in Korea

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SAMSUNG MEDICAL CENTER

1 Overview

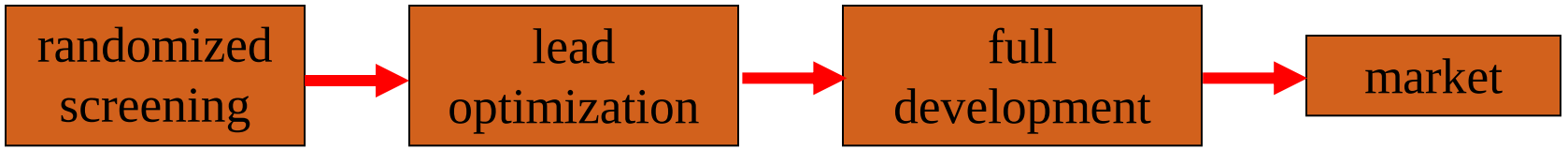
2 Status of Drug Development in Korea

3 R&D Strategy in Korea

4 Experiences of Drug Development in SMC

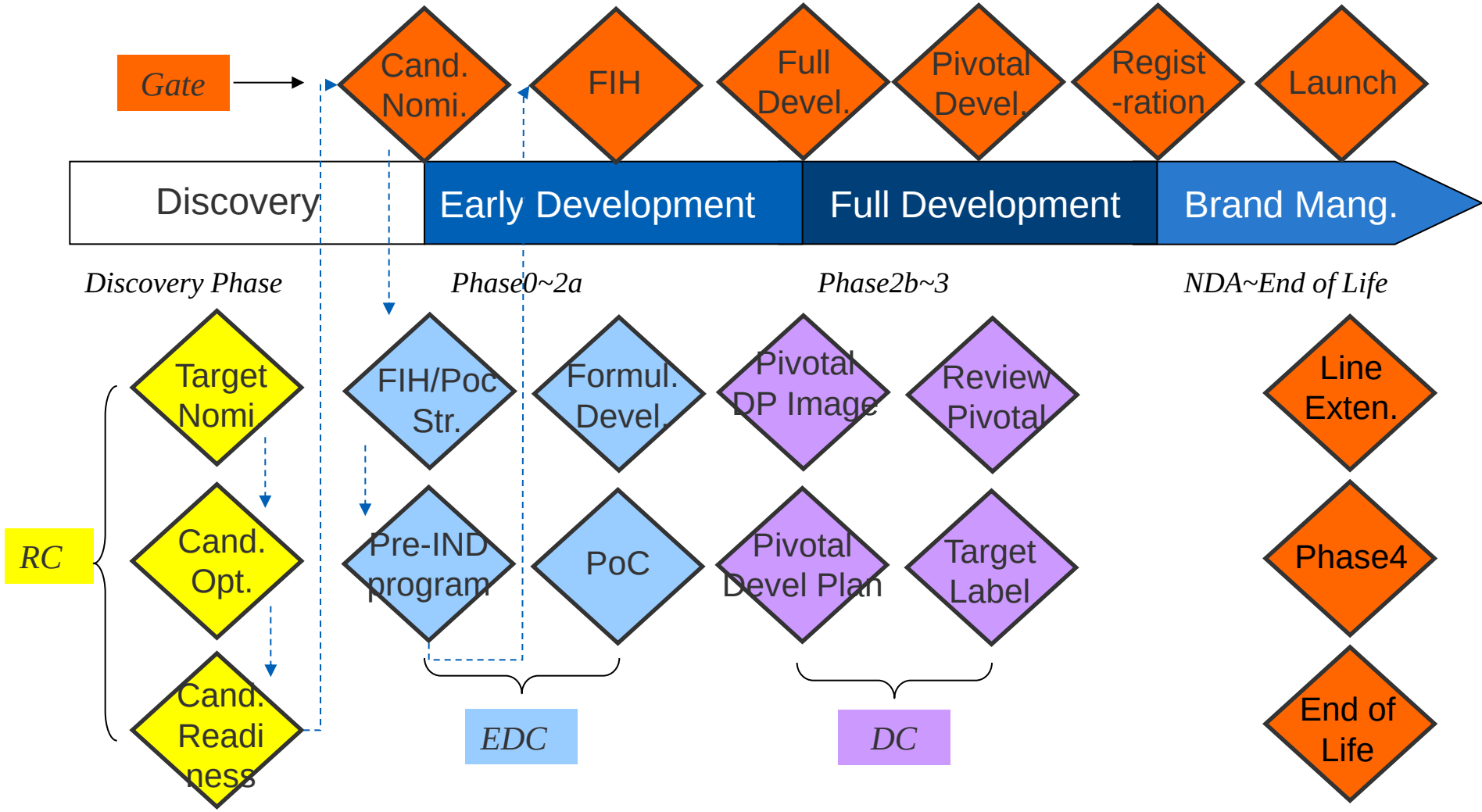
1. Overview

Drug Development; ~'70

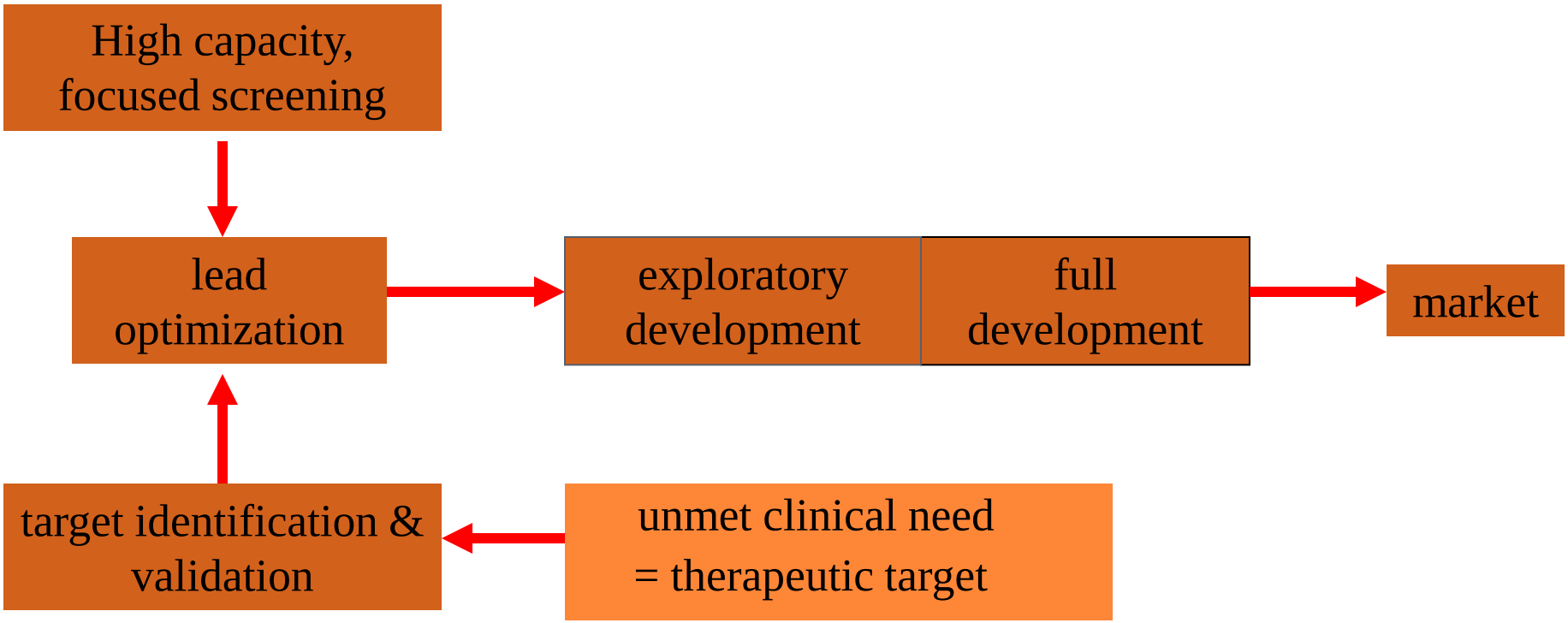


Drug Development; ’70~’90

Drug Development Gate/Milestone



Drug Development; '90~

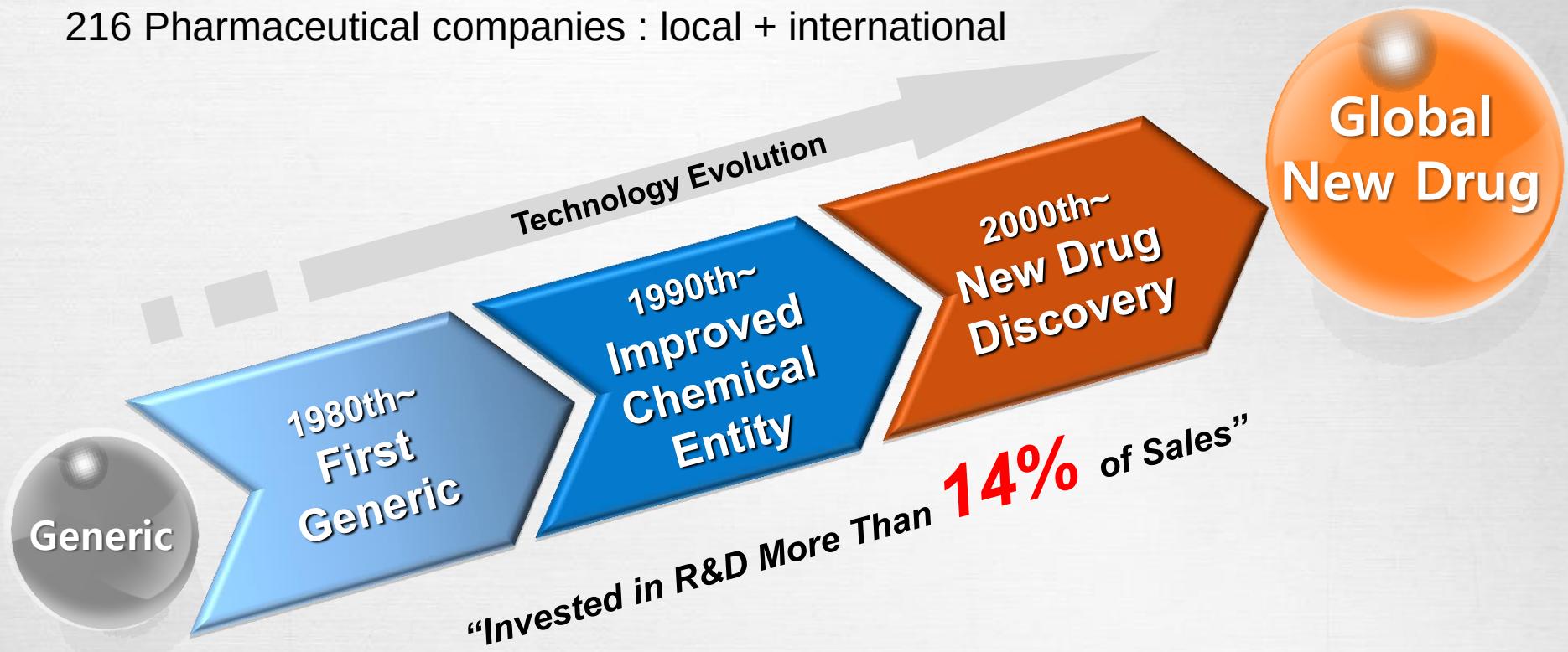


2. Status of Drug Development in Korea

R&D History of Korean Pharm

"Shift from Generics and IMDs to New Drug Discovery"

216 Pharmaceutical companies : local + international



Vision 2020

"Develop 20 New Drugs & Become Global Top 20 Pharmaceuticals"

New Drugs in Korea

Products	Sponsor	Status	Company
Antibiotics, LB20304a	Local	Approval(USA)	LGLS
Anticancer, SK 12503R	Gov.	Approval	SK
Dermatologic, EGF	Gov.	Approval	Daewoong
Anticancer, DW-116HC	Gov.	Approval	Dong Hwa
Antibiotics	Gov.	Approval	Chung Woi
Anticancer, DA-125	Gov.	Phase II(Korea)	Dong A
Hepatitits, G009	Gov.	Phase II(Korea)	Il Yang
Antibiotics, DW-116	Gov.	Phase II(Korea)	Dong Hwa
Hepatitits, YU-439	Gov.	Phase II(Korea)	Yuhan
Antibiotics, CFC-222	Gov.	Phase II(Korea)	CJ
Antidepressants, YKP10A	Local	Phase II(Korea)	SK

New Drug Exportations

Year	Company	Partner	Products
1991.1	LGLS	GSK	Antibiotics
1997.4	Han Mi	Novartis	Anti-Immune
1997.5	LGLS	SB	Antibiotic
2000.1	Dong A	Janssen	Antibiotic
2000.9	Yuhan	SB	Acid blocker
2000.10	Chong Kun Dang	Alza	Anti-Cancer
2001.3	Chung Woi	Chugai	Anti-Cancer
2000.10	LGLS	BioPartners	SR-hGH

Status of Drug Development in Korea

- Strengthen the competitiveness of ***regulations*** based on advanced operation of regulation
  - Facilitate early-phase clinical trials
  - Establish comprehensive management system
- Support for ***infrastructure*** to conduct world-class clinical trials and designate a regional clinical trial centers
  - 15 designated Regional Clinical Trial Centers
  - Designate 142 clinical trial institutions
- Enhance international ***cooperation and collaboration*** among industry, academia and regulatory authority
  - Agreement on mutual cooperation for drug development to facilitate clinical trials in East Asia through the Korea – China – Japan Health Minister Meeting (from 2007)

Historical Overview- KGCP

- 1987 : Establishment of KGCP Guideline as a self-guideline
- 1990 : Accreditation of Clinical Trial Hospitals : 82
- 1992 : New Drug Committee in Central Pharmaceutical Affairs Council (CPAC)
  - *Advisory Expert Review for Clinical Protocol/Reports*
- 1993 : Governmental Initiatives for KGCP implementation
  - *Written Informed Consent, Optional IRB Approval*
  - *Inspection(Audit) of Clinical Trial*
- 1992-1994 : Revision of KGCP - enforcement, 1995. 10
- 2000 : Revision of KGCP - enforcement, 2001.1
  - *Almost identical to the ICH E6 Guideline*
- 2012 : Bioethics policy

Major Changes in New Drug Regulations

Dec. 12, 1999 (enforced .Jul. 1, '00)	• **Adoption of the Bridging Concept** - Harmonized to ICH guideline E5 - Diverse bridging strategies were required
Jan. 4, 2000 (enforced Jan. 1, '01)	• **KGCP Amendment for Harmonizing with ICH GCP** - Harmonized with ICH guideline E6 - Protect the rights and safety of subjects - Responsibility of investigator
Dec. 3. 2002	• **Introduction of IND System** - Separation between developmental clinical stage and commercial product approval, such as IND and NDA - Participation in international study enabled
Jun. 30. 2006	• **Organization of Clinical management Division**
Jan. 4. 2007	• **Introduction of Joint-IRB**

Regional Clinical Trial Centers

KoNECT 국가임상시험사업단
Korea National Enterprise for Clinical Trials

Korea National Enterprise for Clinical Trials

· 15 designated Regional Clinical Trial Centers

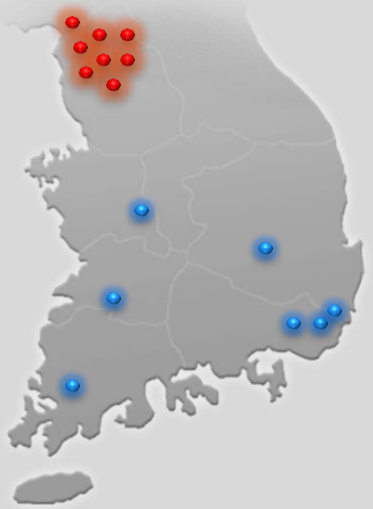
· US $ 3.5 Million / 5 yrs

· Similar to **NIH-GCRC** in US [**N**ational **I**nstitutes of **H**ealth – **G**eneral **C**linical **R**esearch **C**enters]

2004
2005
2006
2008
2009
2010

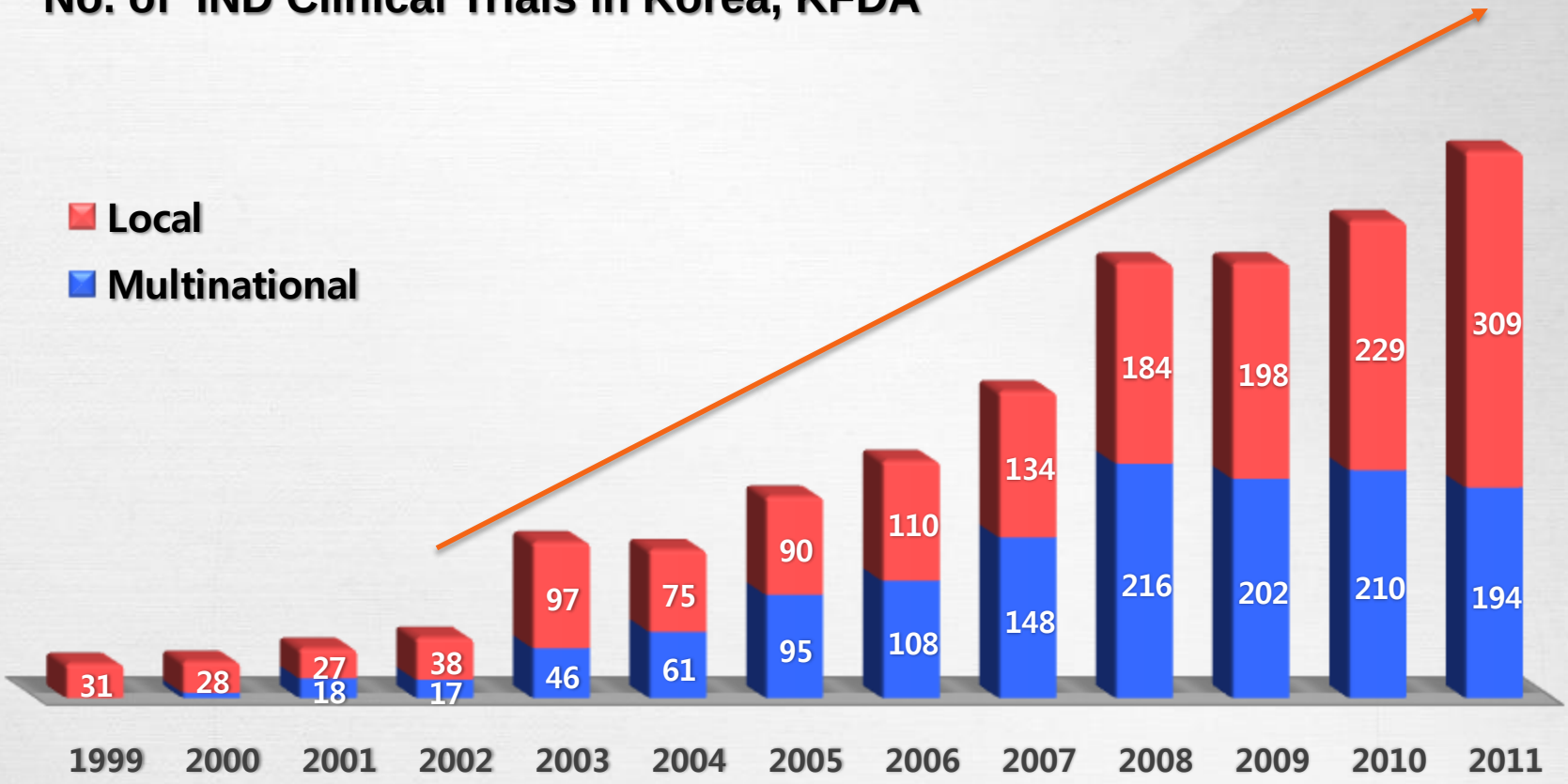
CTC 서울대학교병원 임상시험센터
보건복지가족부지정 인제대학교 부산백병원 CTC 임상시험센터
경북대학교병원 임상시험센터 KNUH Clinical Trial Center
RCTC
Clinical Trials Center Yonsei University Health System
CMC Clinical Research Coordinating Center CRCC
ASAN Medical Center Clinical Research Center
CTC 전북대학교병원 임상시험센터
인하대병원 임상시험센터
Clinical Trials Center
CTC SMC
고려대학교안암병원 KOREA UNIVERSITY ANAM HOSPITAL
동아대학교의료원
PNUH

SAMSUNG SAMSUNG MEDICAL CENTER
CTC CLINICAL TRIAL CENTER SAMSUNG MEDICAL CENTER SMC



Clinical Trials in Korea

No. of IND Clinical Trials in Korea, KFDA



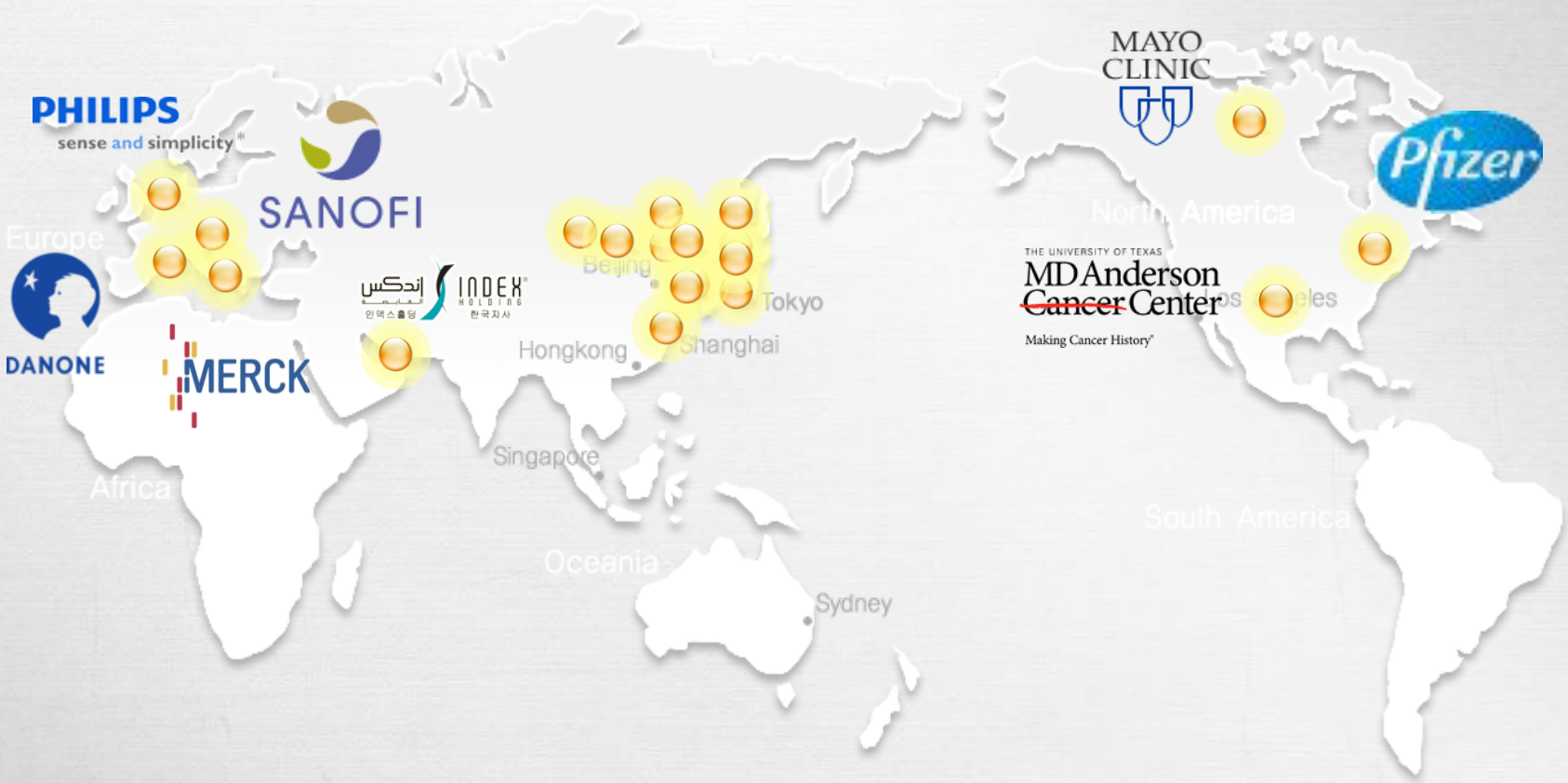
In 2002, IND was Separated from NDA in Korean Regulation

Source : Official Statement of KFDA (Feb. 2012)

Collaborations

Agreement, Partnership & MOU

Regulator, , Global Leading Hospital, Global Pharmaceutical Company, Medical Device Company



Where Are We Now ?

SWOT Analysis

Strengths

- Strong Government's Leadership
- Ambitious People with well Education
- Strong Basic Science
- Good Medical Infrastructure
- Proven Record in Clinical Development

Weaknesses

- Language Barrier
- Lack of Continuity
- Limited Experience in Drug Development
- Bueauracracy
- Transparency
- Global Standard

Opportunities

- Decreasing R&D Productivity
- Financial Crisis
- Open Innovation

Threats

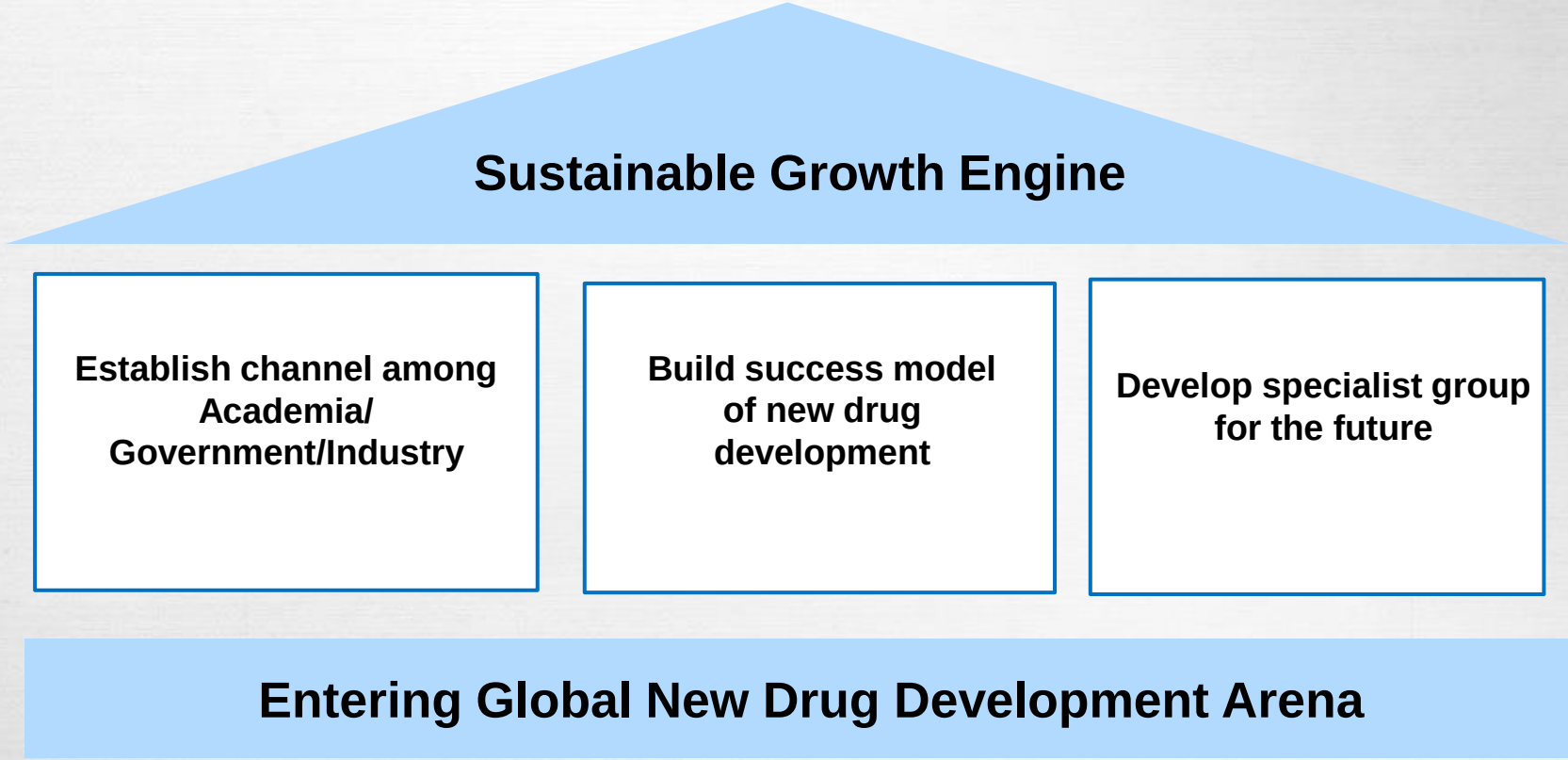
- Open Competition
- Economic Downturn
- Prioritization

3. R&D Strategy in Korea

R&D Strategy

- Discovery/Research → Development ?
- INNOVATION and COLLABORATION
  - To conduct First in Class Research, we need innovative partnership with academia and hospitals
  - To find new druggable targets, new disease & treatment mechanism, we have to collaborate
  - Patient Information and tissue are very important to development of ‘personalized medicine’
  - Specialists
    - Discovery / Research specialists
    - Development specialists
    - Clinical specialists

R&D Strategy in Korea



Scope of New Drug Development in Korea

Basic Scientists

Preclinical Scientists

Pharm.Companies

Clinical Investigators

KRICT Korea Research Institute of Chemical Technology

KRIBB Korea Research Institute of Bioscience & Biotechnology

KIT 안전성평가연구소 Korea Institute of Toxicology

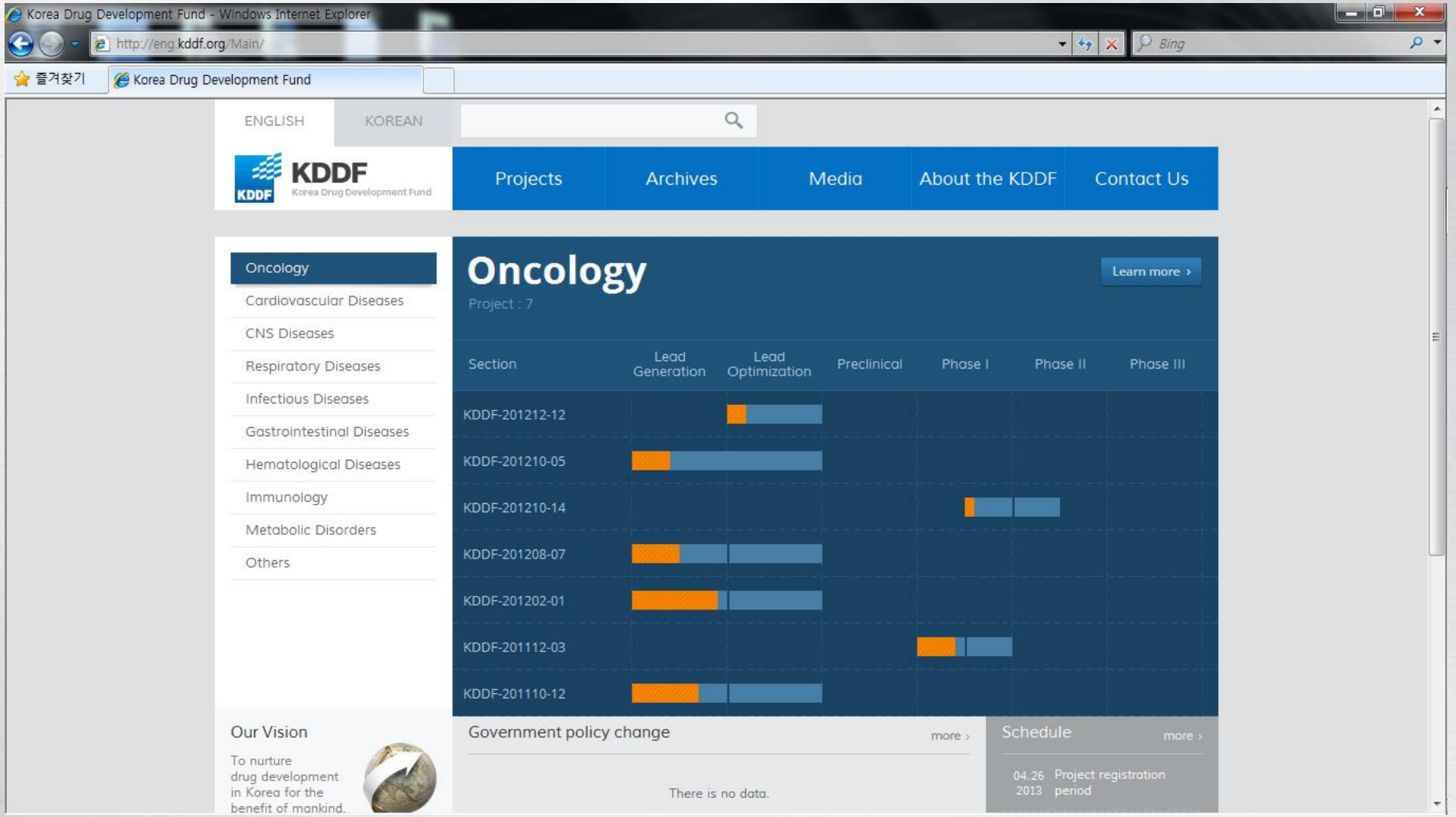
KBIO OSONG MEDICAL INNOVATION FOUNDATION Global Medical R&D Hub

DGMIF Daegu-Gyeongbuk Medical Innovation Foundation

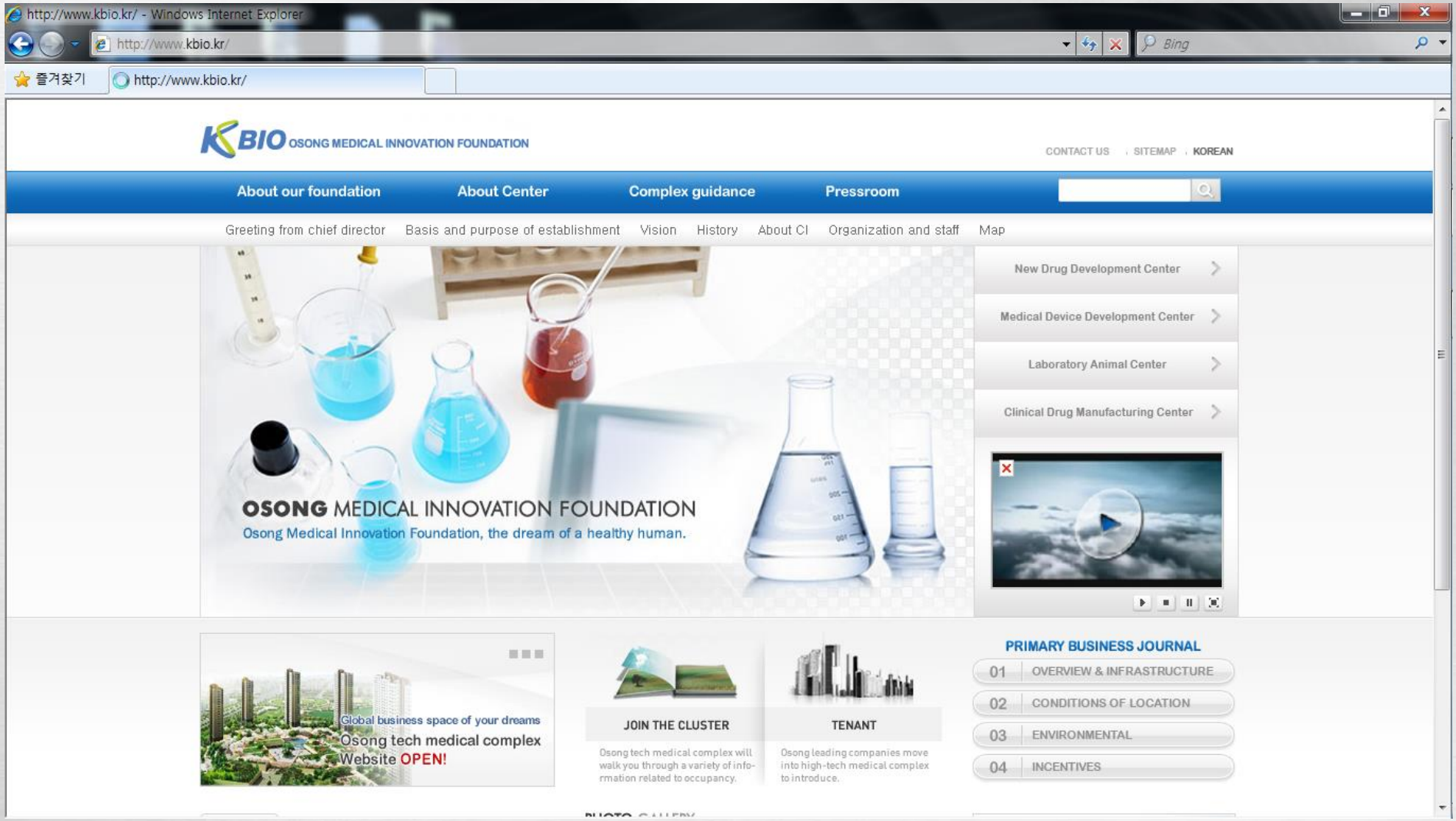
KDDF Korea Drug Development Fund

KoNECT Korea National Enterprise for Clinical Trials

Korea Drug Development Fund



KBIO Osong Medical Innovation Foundation

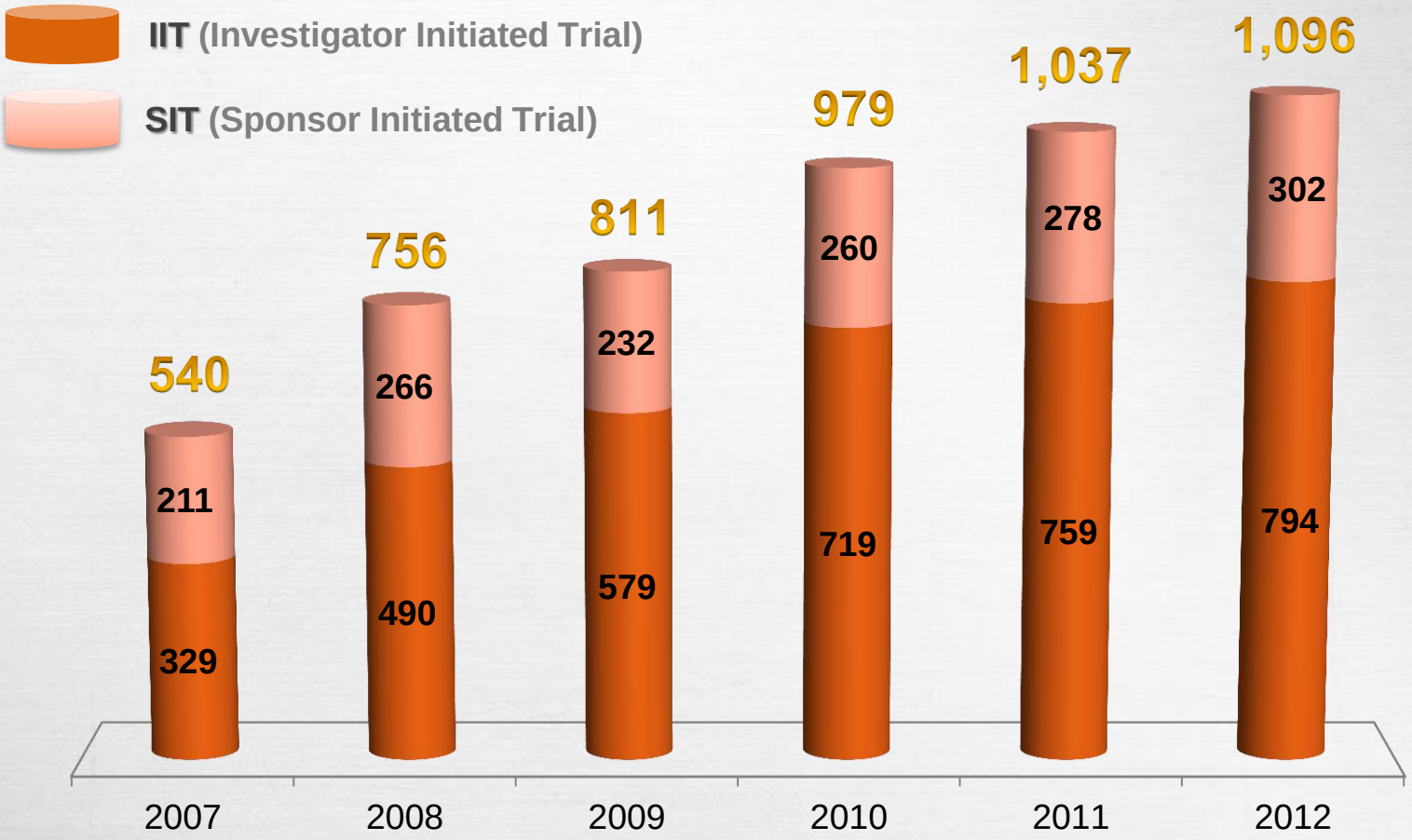


DGMIF Daegu-Gyeongbuk Medical Innovation Foundation

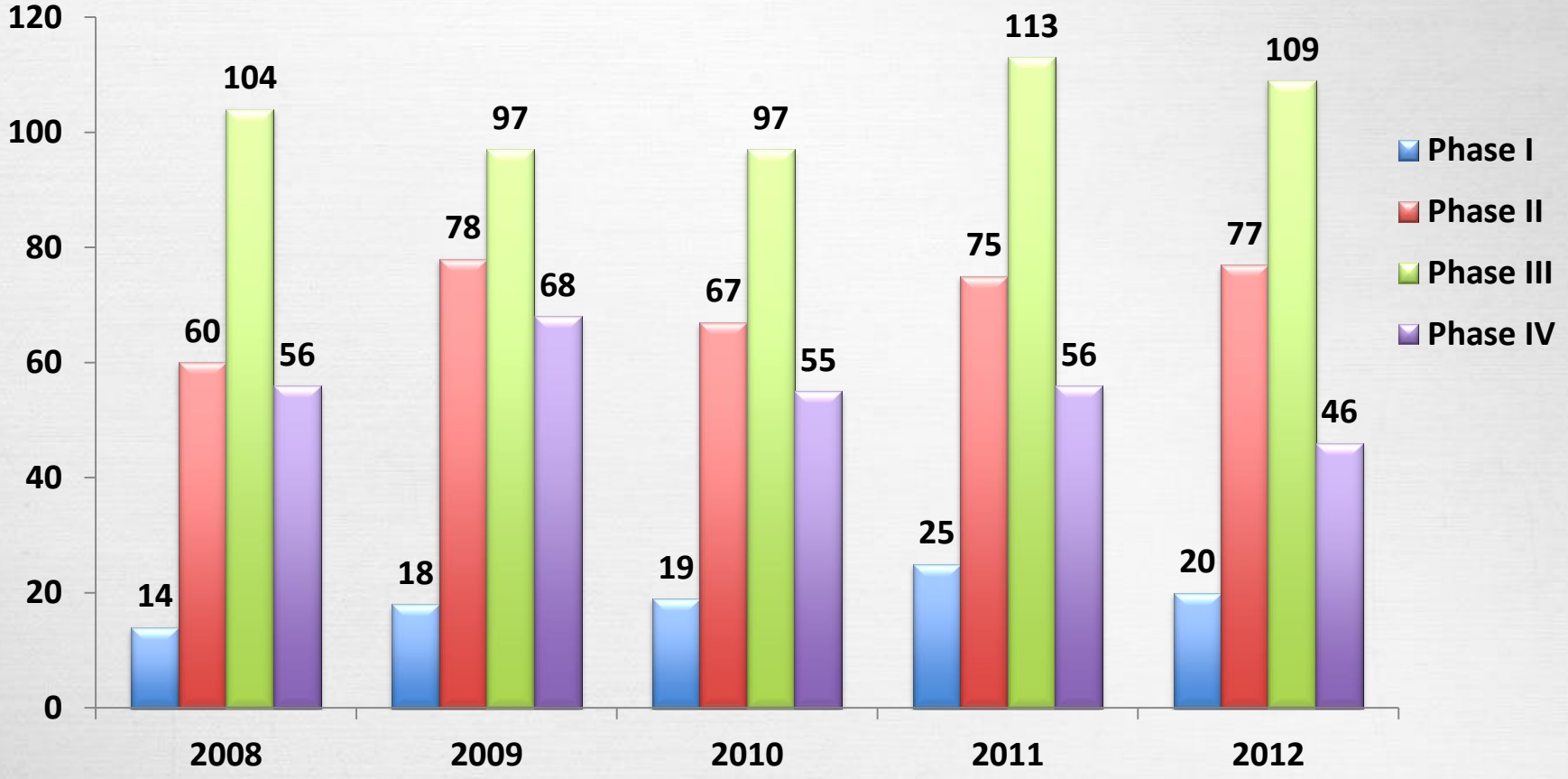
4. Experiences of New Drug Development in SMC

New Clinical Trials in SMC (Total)

Source : SMC e-IRB [2007 ~ 2012]



New Clinical Trials in SMC (by phase)

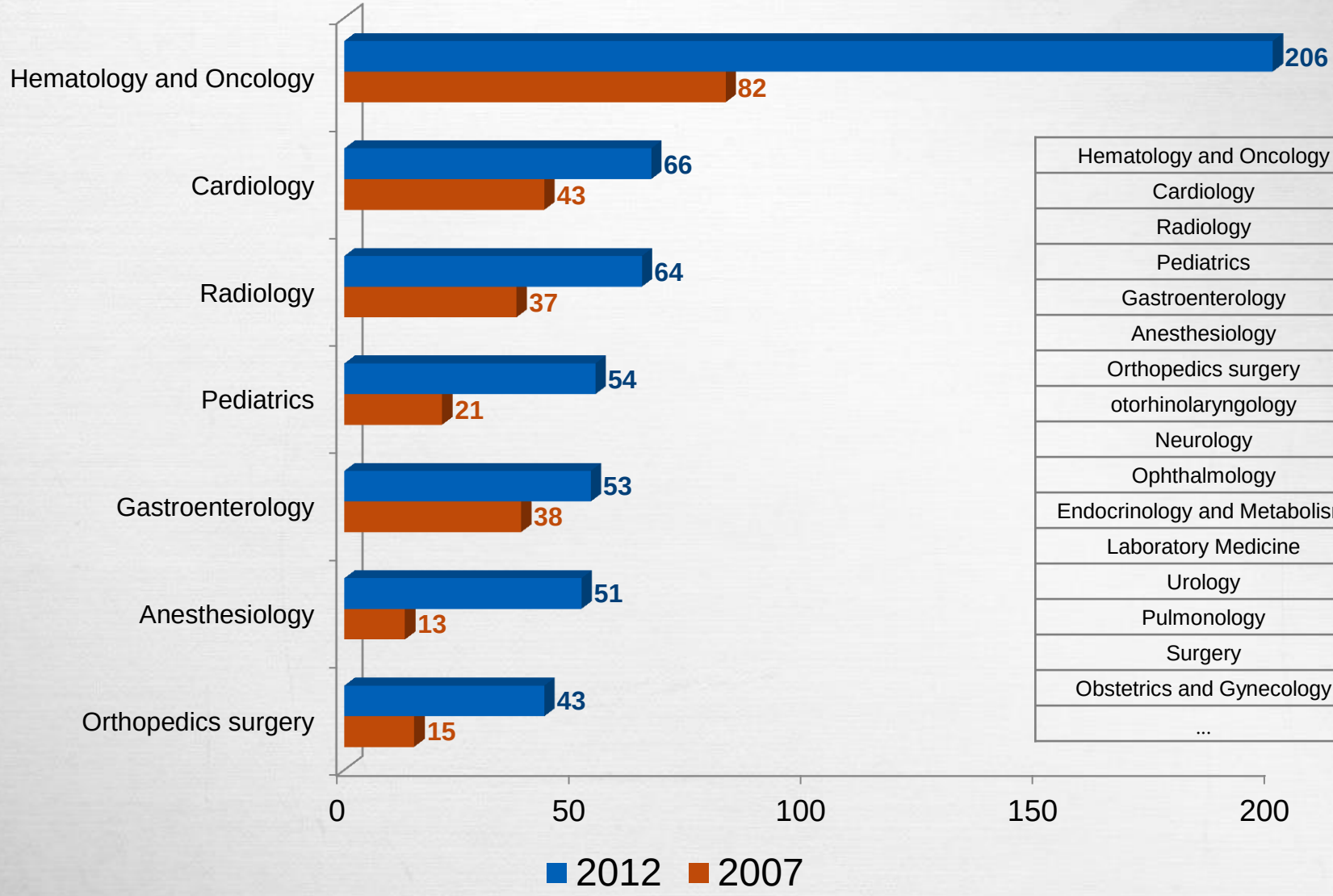


Total	234	261	238	269	252

2008 ~ 2012 SMC IRB, New studies

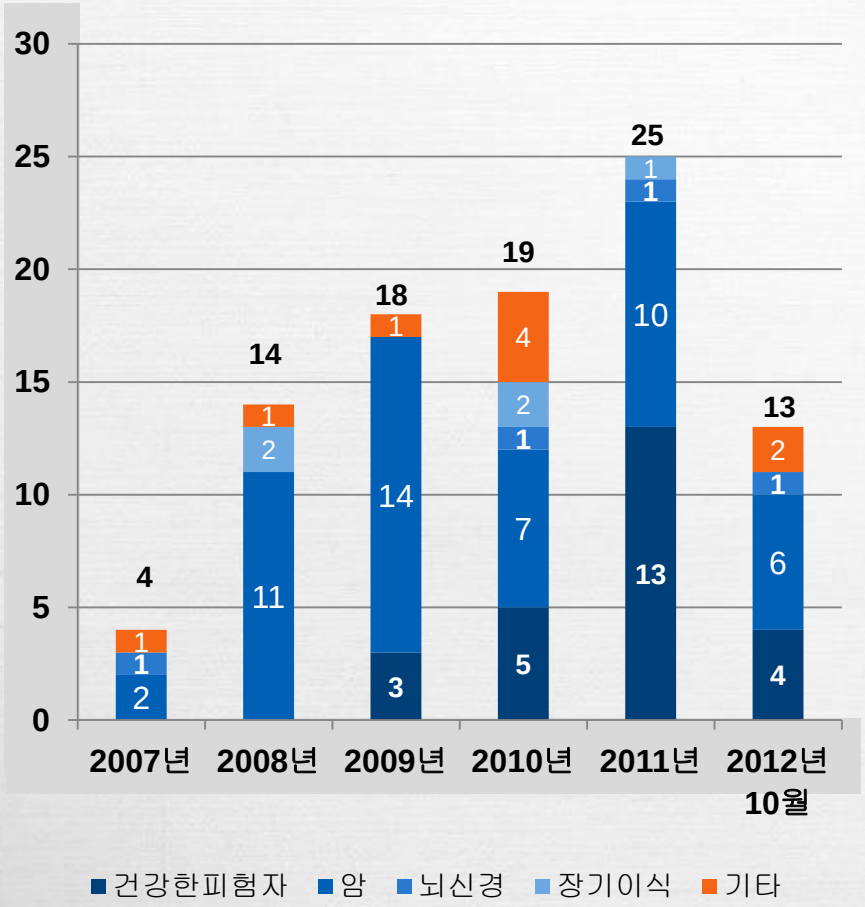
New Clinical Trials in SMC (by department)

Source : SMC e-IRB [2007 ~ 2012]



Hematology and Oncology	206
Cardiology	66
Radiology	64
Pediatrics	54
Gastroenterology	53
Anesthesiology	51
Orthopedics surgery	43
otorhinolaryngology	40
Neurology	40
Ophthalmology	38
Endocrinology and Metabolism	35
Laboratory Medicine	34
Urology	34
Pulmonology	32
Surgery	30
Obstetrics and Gynecology	22
...	...

Early Phase Clinical Trials



[First in Human Study]

- **Total of 3 projects**
  - 2010 : 1, 2011 : 2
- **LY287--- Study**
  - Advanced cancer, multi-national
- **Tanibi --- Study**
  - Advanced cancer, new antiangiogenic Ab
- **YH ---- Study**
  - Healthy volunteer, RA

SMC IRB, New studies

SAMSUNG MEDICAL CENTER
as Research Oriented Hospital

CINICAL RESEARCH INSTITUTE

Clinical Research Institute

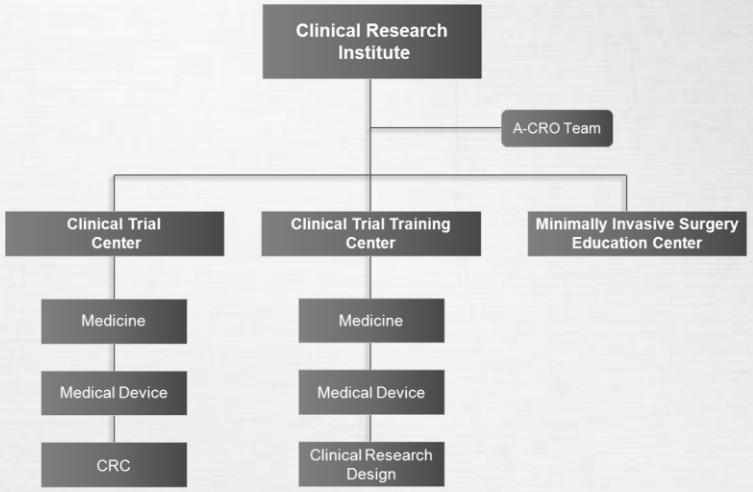
1999
Clinical Trial Center

2003
Clinical Trial Training Center

2008
3 Government Awards
"Regional Clinical Trial Center",
"Clinical Trial Professional Training Academy (PI)"
"Medical Device Clinical Trial Center"
by Korean Ministry for Health & Welfare

2010
Research Center for Future Medicine
& Opening Academic CRO

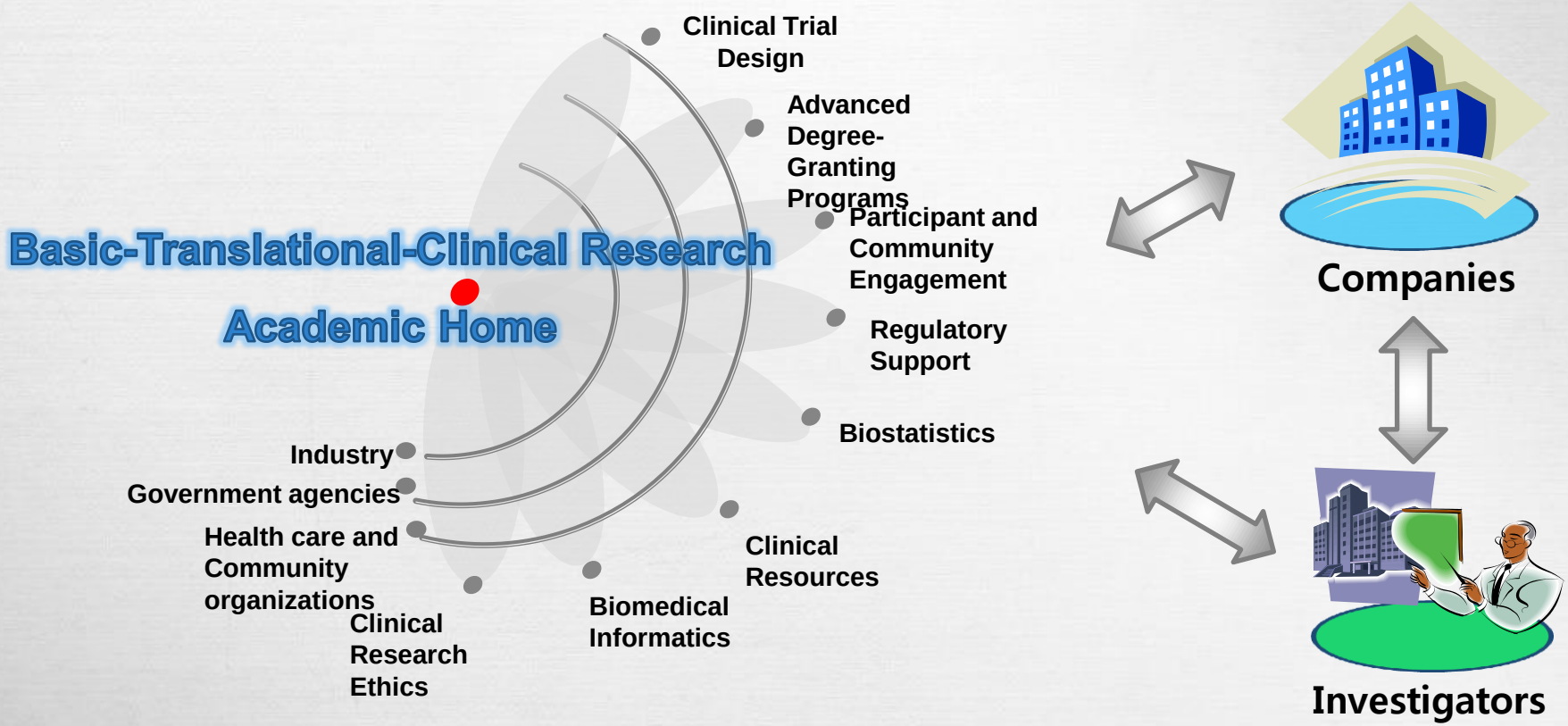
2011
Samsung Research Institute for Future Medicine



All Phase New Drug Development with SMC

□ Collaboration among Core Facilities

- CRI, T-CRO (Translational Clinical Research Operation) with Clinical Data Warehouse
- Animal Lab, Tissue Bank, Genomic Research Institute, Molecular Imaging Center, etc



Hunter syndrome

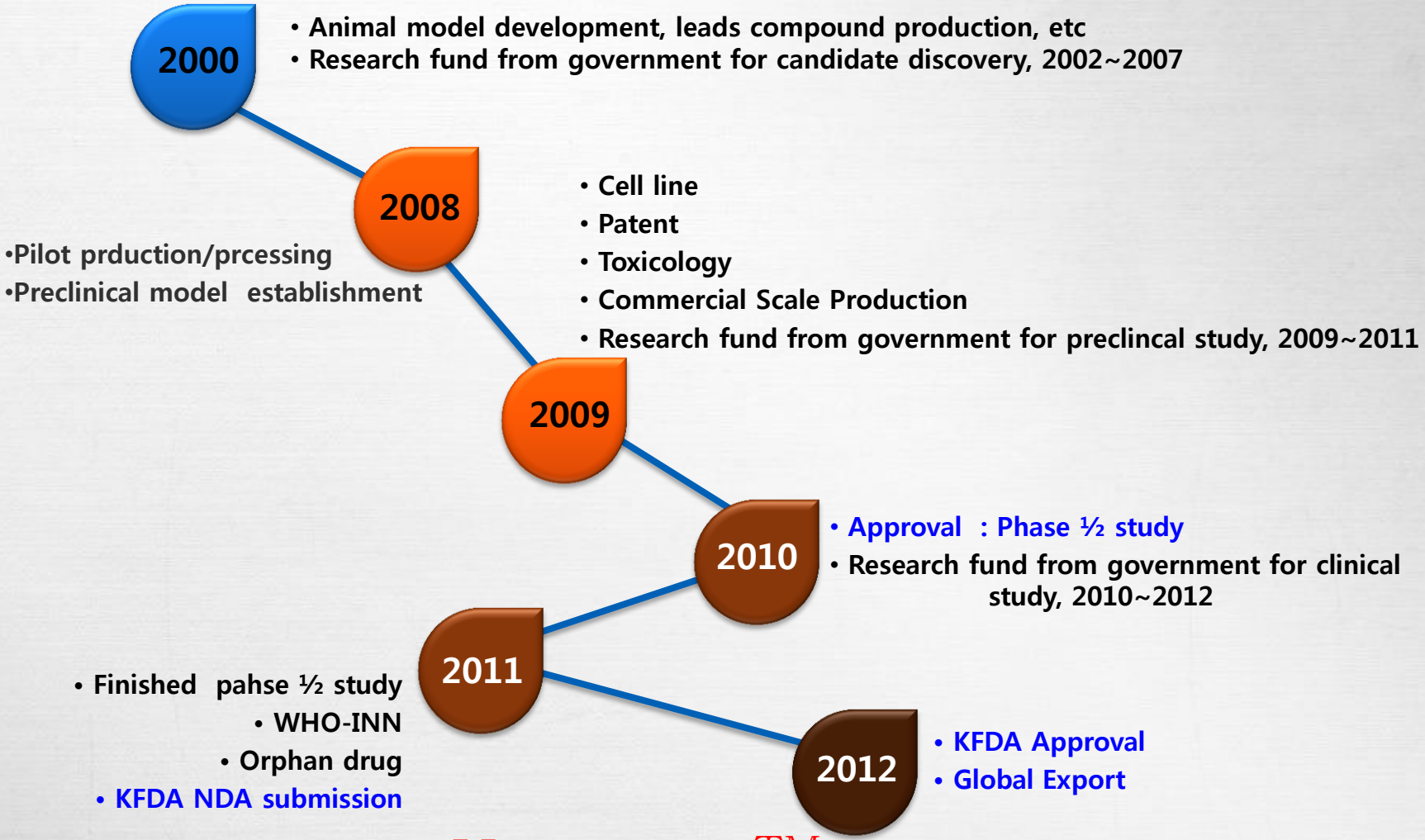
- Genetic disease associated with X-chromosome
- Mucopolysaccharidoses, MPS type II
- Metabolic syndrome with accumulation of heparan sulfate, dermatan sulfate etc.
- Mental & physical retardation, early death (10~15 years)
- Incidence : 1 / 100,000 ~ 150,000 male
- ***"Elaprase™*** : Unique & exclusive drug, very expensive

Paradigm Shift in Drug Development

Shift away from primary care blockbuster model	→	Towards targeting more niche patient populations
▪ Long expensive R&D process costing on average $1bn ▪ Competition from me-too and generic drugs ▪ Most drugs only work in approximately 50% of patients ▪ Risk of side effects and pharmacovigilance issues		▪ Faster and often cheaper R&D process allowing a greater time at market ▪ Smaller sales forces required ▪ Orphan drugs receive incentives such as market exclusivity, tax and fee reductions and regulatory assistance ▪ Greater focus on "specialty" pharma and personalized medicines targeting small patient populations with high value drugs

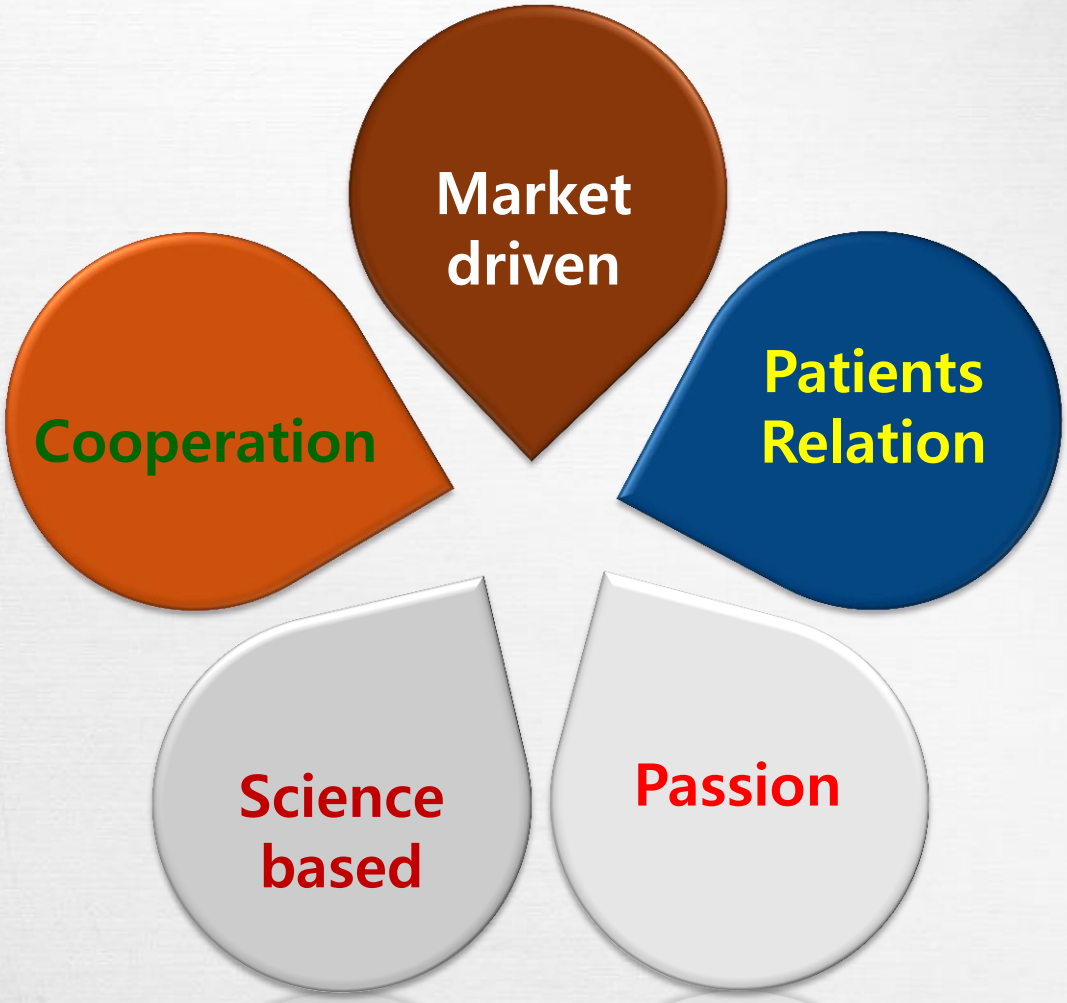
DataMonitor "Orphan Drug Trends 2011 (Nov. 2011)

Examples of New Drug Development



Hunterase™

Factors


Market driven
Cooperation
Patients Relation
Science based
Passion

Players of Drug Development

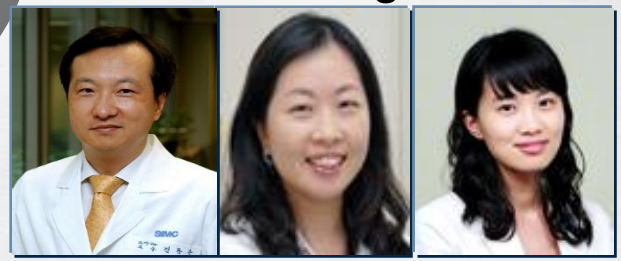
대한민국정부
korea.go.kr

Clinical Research Institute

GREEN CROSS

SMC

SMC Investigators



Towards The Global Drug Development

- Networking
- Open innovation
- Collaboration

감사합니다 !

感謝 !

Thanks !