

한국 바이오헬스산업의 진단과 전망

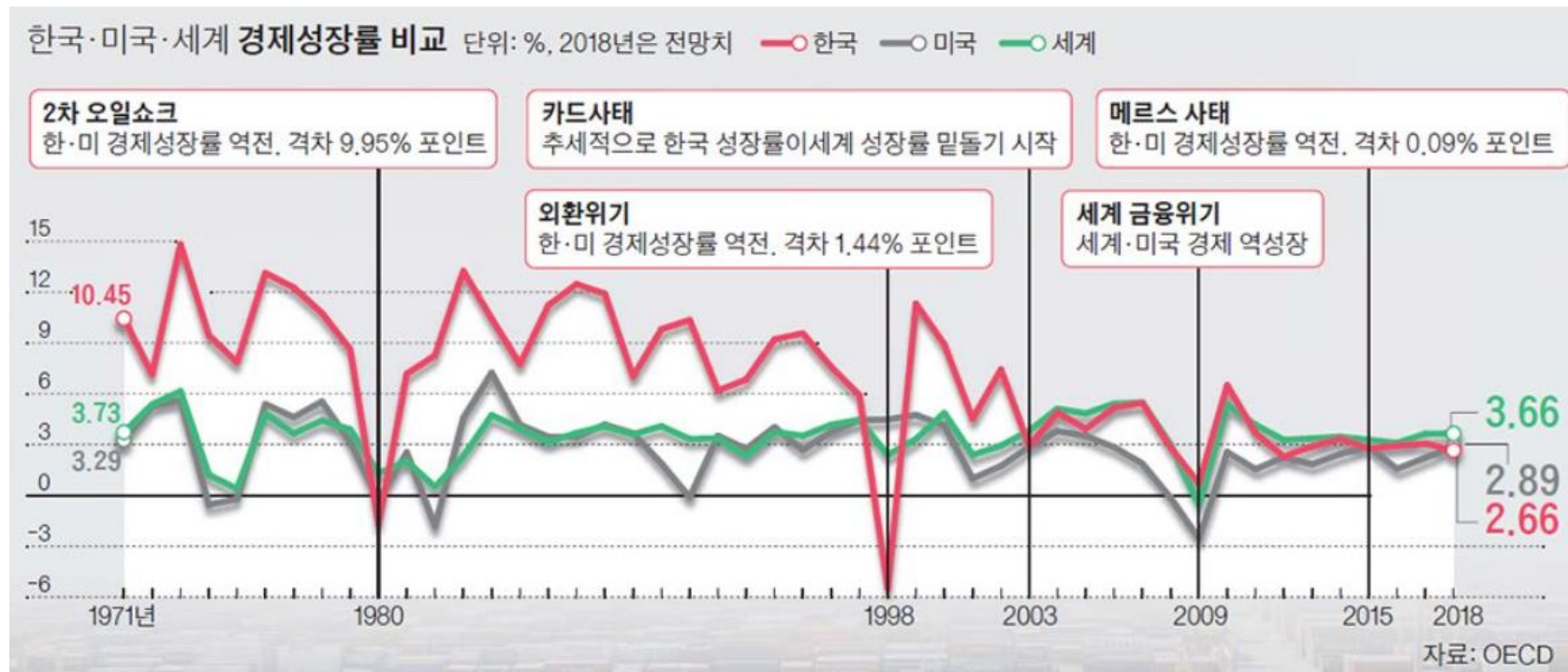
2019. 5. 15

유승준 부사장(CSO)

(주)티피헬스케어



한국 경제의 성장 흐름



*1차 (-) 성장 : 1980년 -1.89%

*2차 (-) 성장 : 1998년 -5.71%

Global Economy by GDP

: Korea 1.86%

BY THE NUMBERS

The global economy by GDP

\$74 trillion

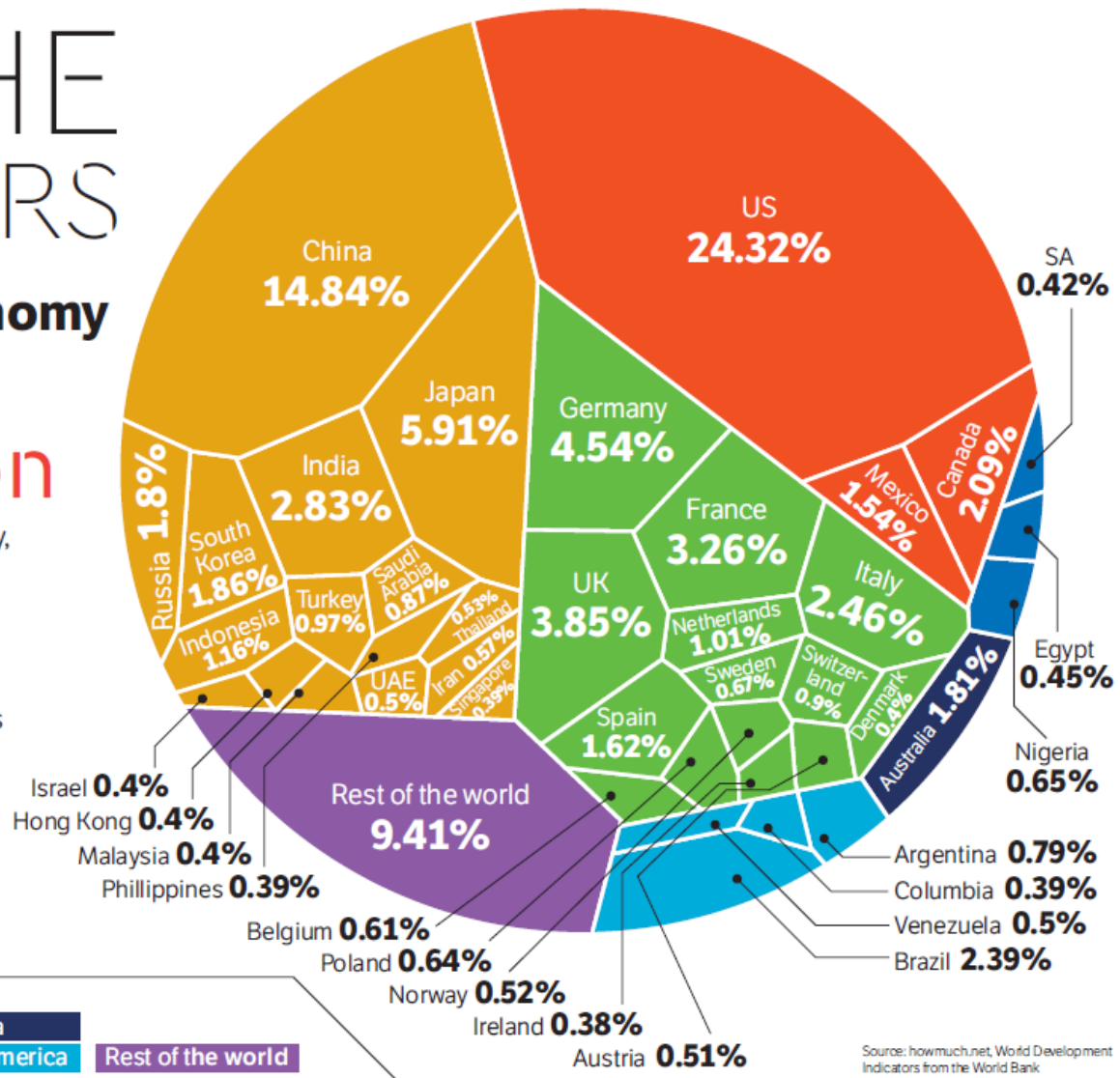
is the size of the global economy, according to World Bank data

40

of the world's largest economies are plotted here

155

countries make up the "rest of the world" section of this chart



Source: howmuch.net, World Development Indicators from the World Bank

주력산업의 수출액 비교

한국 주력산업의 수출액 증가율		
(%)		
구분	2005~2011 CAGR	2011~2017 GAGR
반도체	7.0	12.2
자동차	10.8	-1.2
석유화학	14.7	-0.3
조선	21.0	-4.5
철강	14.4	-3.5
일반기계	14.3	1.2
통신기기	3.7	-6.9
디스플레이	31.2	-10.4
가전	-3.7	-3.2
섬유	3.7	-3.4

(ISTANS, 삼정KPMG 경제연구원, 2018)

주력산업 세계 점유율

< 2017년 한국 반도체산업 세계 점유율, 세계 1위 >

반도체: 20.9% (86,245/412,221 백만달러)

- **메모리: 64.5%** (79,944/123,974 백만달러)

- **시스템: 2.9%** (6,301/219,212 백만달러)

* 삼성전자와 SK하이닉스 매출 정보만 포함
(한국무역협회, 2019)

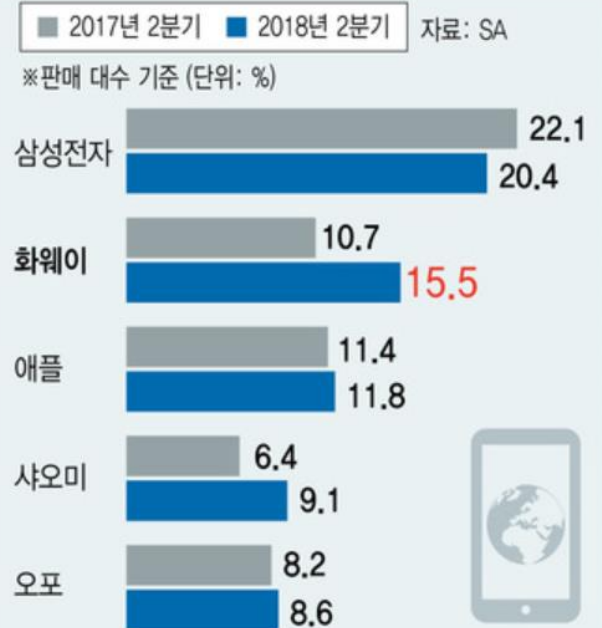
< 2017년 한국 자동차산업 세계 점유율, 세계 4위 >

현대-기아: 7.7%

폭스바겐 11%(1위), 토요타 10.8%(2위), 르노-닛산 10.7%(3위)

(한국무역보험공사, 2018)

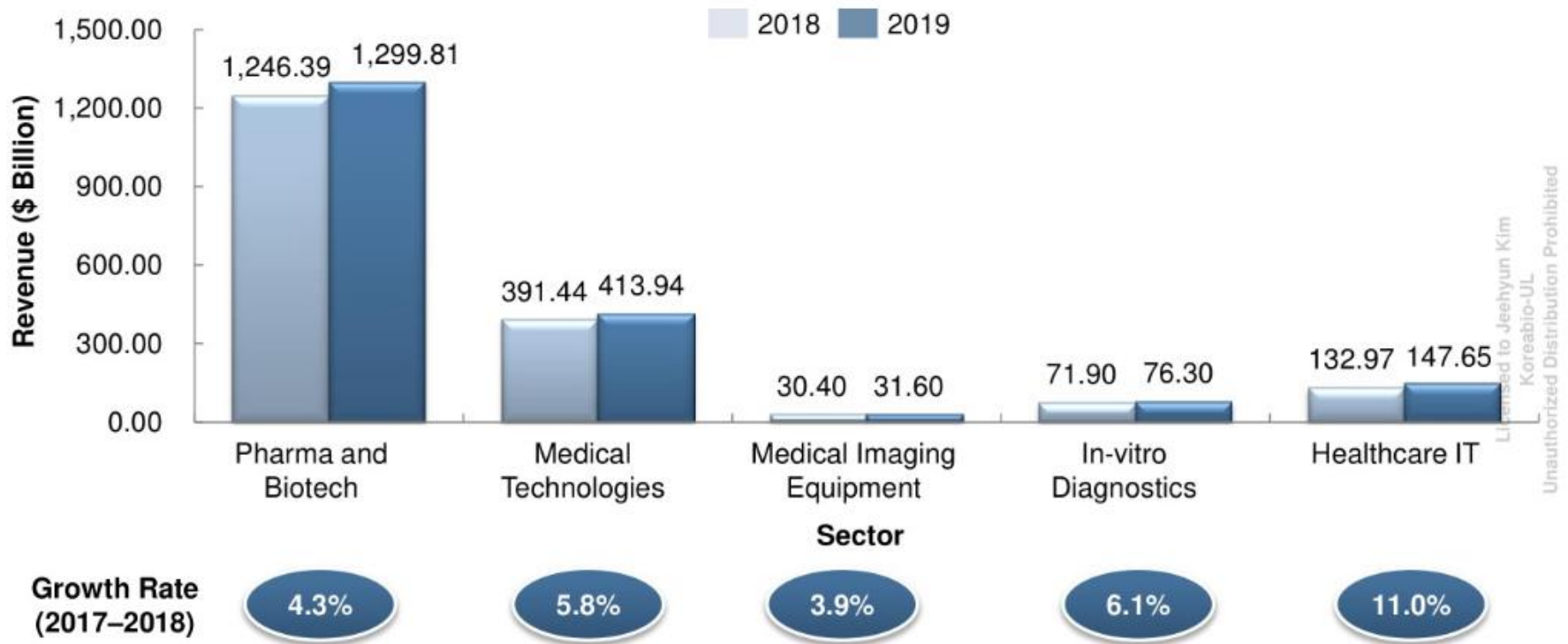
세계 스마트폰 시장 상위 5위 점유율



바이오헬스산업은?

Global Bio-Health Industry

Total Healthcare Industry: Revenue Forecast by Sector, Global, 2018 and 2019



	2018	2019	Growth Rate
Total Healthcare Market (\$ Billion)	1,873.10	1,969.30	5.1%

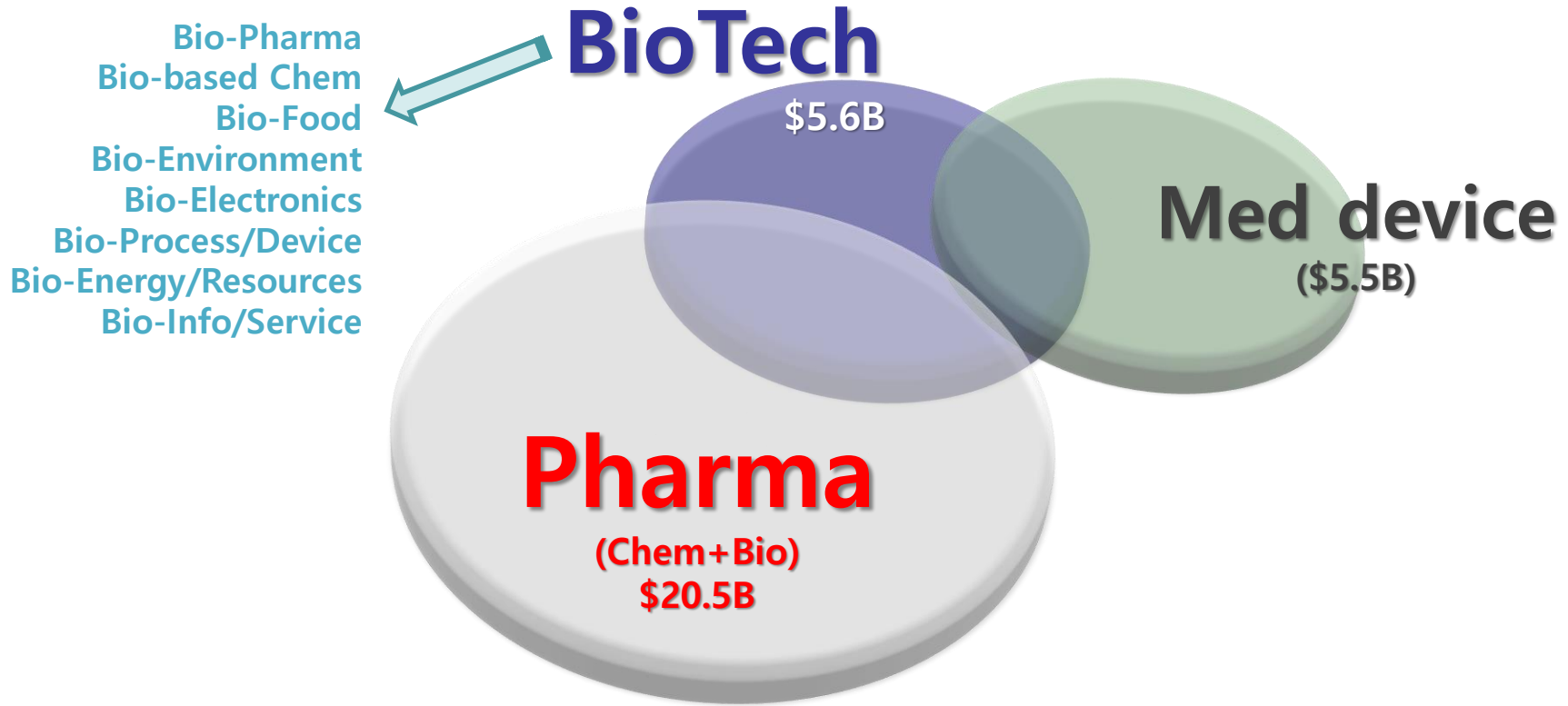
\$300Bn?



(Image: Getty/Pogonici)

Korea's Bio-Health Industry (about \$31.6B, 2016)

👉 2% Trap



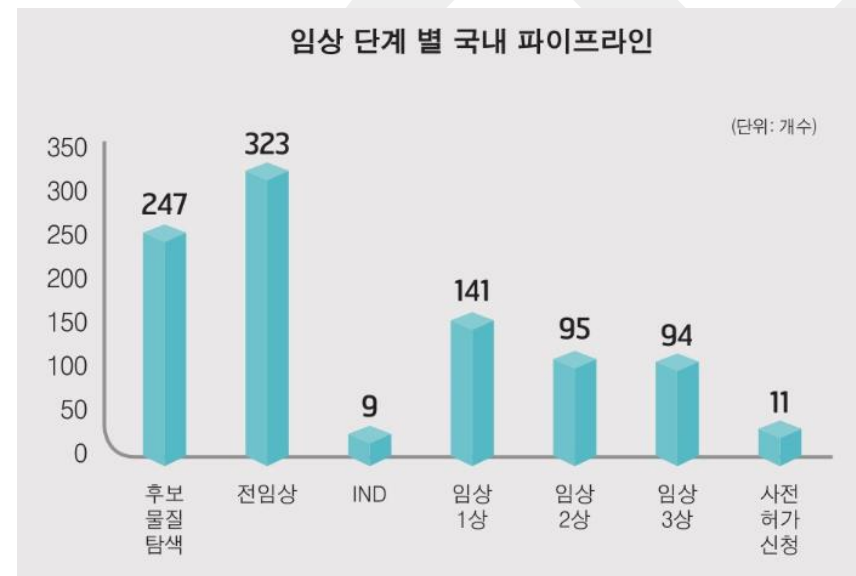
Global Share (2016)

- **Biotechnology : 1.58%** (5.6B/353.9B) (1.70, 2014)
- **Pharma : 1.81%** (20.5B/1129B) (1.78%, 2014)
- **Medical Device : 1.38%** (5.5B/400B) (1.41%, 2014)
- **Bio-Health : 2.24%** of GDP (1.93%, 2014)

Drugs & Pipelines

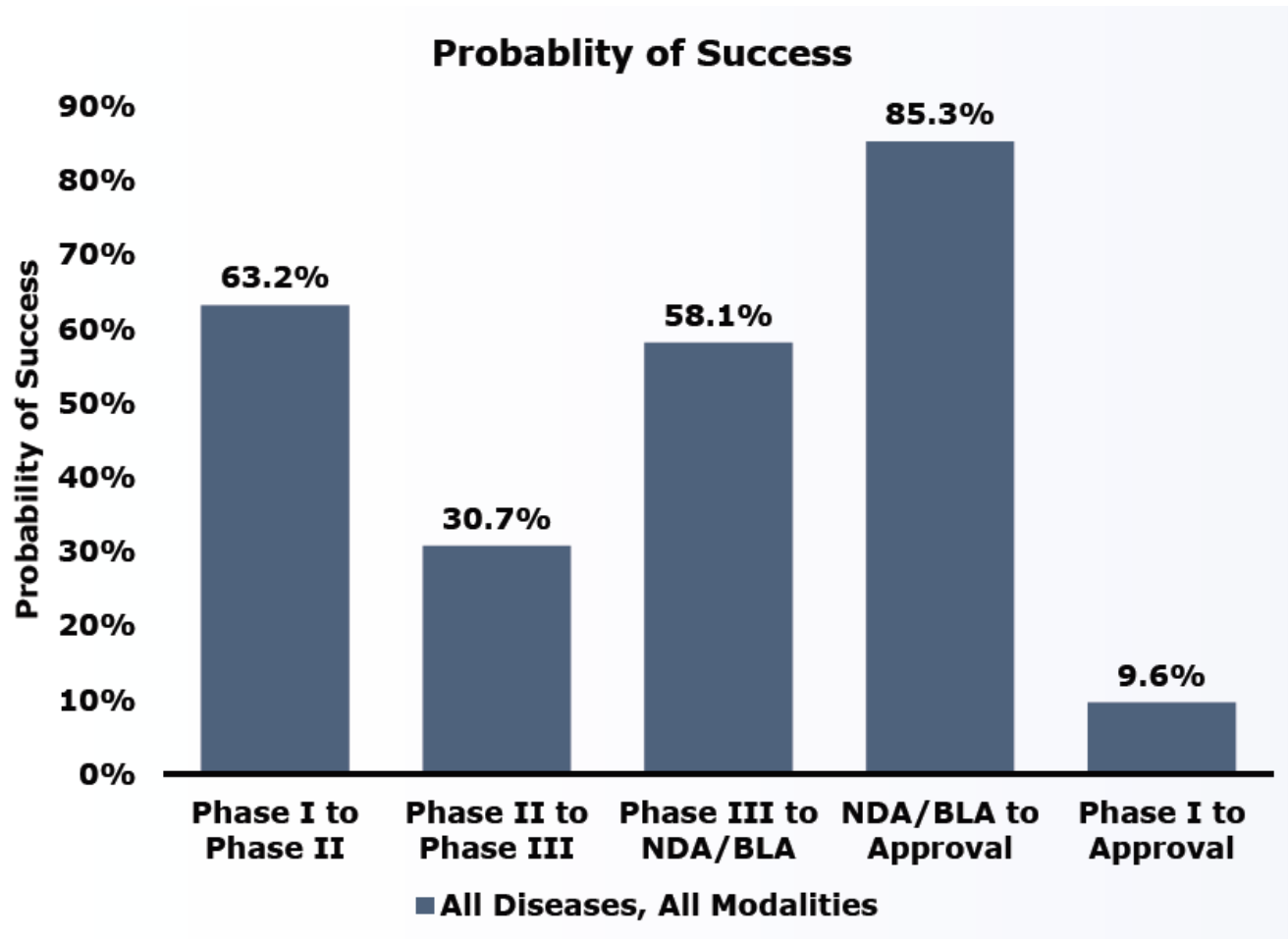
30 New Korean-made drugs gained KFDA approvals

908 pipelines are now underway by 180 companies



*Source: 한국바이오경제연구센터 BioEconomy Report 2호, 2017

Success Rate of Drug Approval (Overall)



*Source: Clinical Development Success Rates 2006-2015 (BIO/Biomedtracker/Ampilon)

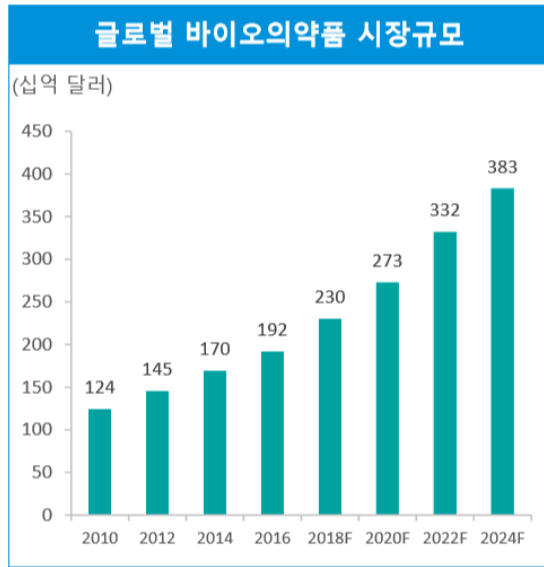
Recent Highlights

〈도표3〉 2018년 주요 라이선스 딜 사례

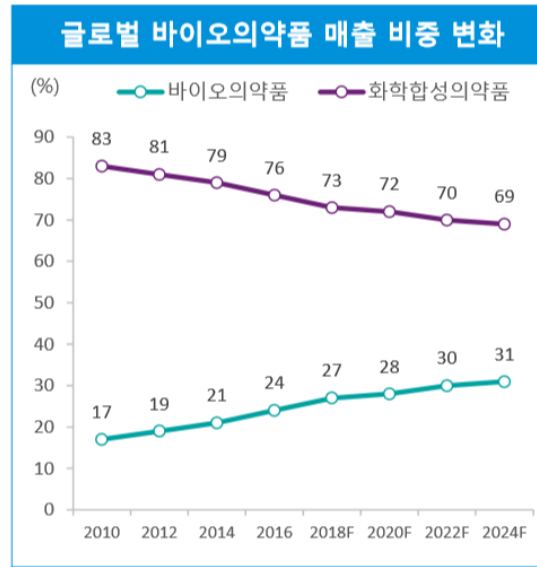
	기업명(개발사)	물질명 및 적응증	계약상대	계약규모	계약범위
1월	동아ST	DA-9801 (당뇨병성신경병증)	美 뉴로보파마슈티컬스	1억 8,000만\$ 계약금 200만\$	글로벌판권 (한국 제외)
2월	SK케미칼	독감 백신	美 사노피파스퇴르	1억 5,500만\$ 계약금 1,500만\$	미국, 유럽
6월	크리스탈지노믹스	CG026806 (급성골수성백혈병)	美 애플트즈바이오사이언스	1억 2,500만\$ 계약금 300만\$	중국
7월	ABL 바이오	ABL001외 4종 (항암 항체신약물질)	美 트리거테라퓨틱스	5억 5,000만\$ 계약금 430만\$	글로벌판권 (한국 제외)
7월	유한양행	YH14618 (퇴행성디스크)	美 스파인바이오파마	2억 1,815만\$ 계약금 65만\$	글로벌판권 (한국 제외)
8월	JW중외제약	JW1601 (아토피)	덴마크 레오파마	4억 200만\$ 계약금 1,700만\$	글로벌판권 (한국 제외)
11월	애플론	AC101 (항암 항체신약물질)	中 상하이헨리우스	4,000만\$ 계약금 1,000만\$	글로벌판권
11월	유한양행	레이저티닙 (폐암)	안센	12억 5,500만\$ 계약금 5,000만\$	글로벌판권 (한국 제외)
11월	코오롱생명과학	인보사 (골관절염)	日 먼디파마	5억 9,160만\$ 계약금 300억원	일본
11월	인트론바이오	SAL200 (슈퍼박테리아)	로이반트	6억 6,750만\$ 계약금 1,000만\$	글로벌판권

자료: 전자공시, 한양증권 리서치센터

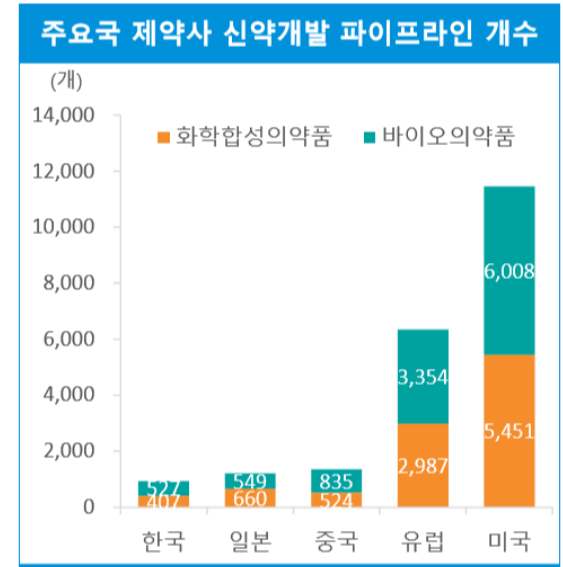
바이오헬약품시장의 성장과 특징(1)



Source: EvaluatePharma(2018)



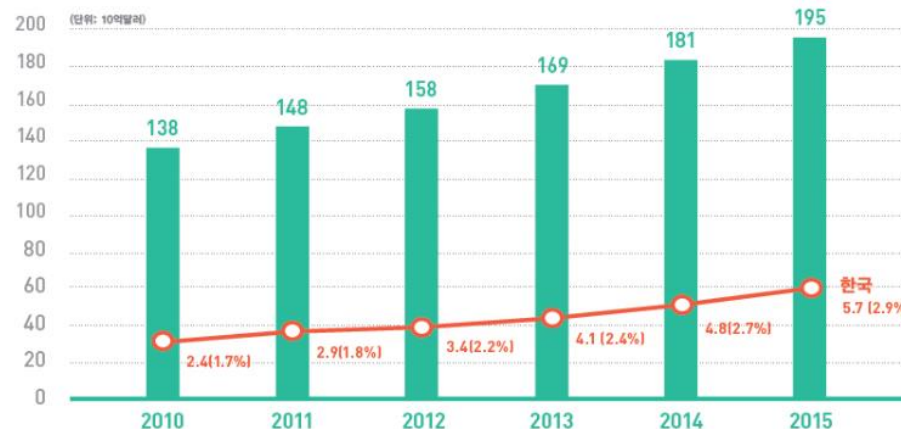
Source: EvaluatePharma(2018)



(자료: 한국바이오헬경제연구센터/삼정KPMG)

세계 바이오헬약품 시장규모 추이

자료 : 식품의약품안전처(2012)

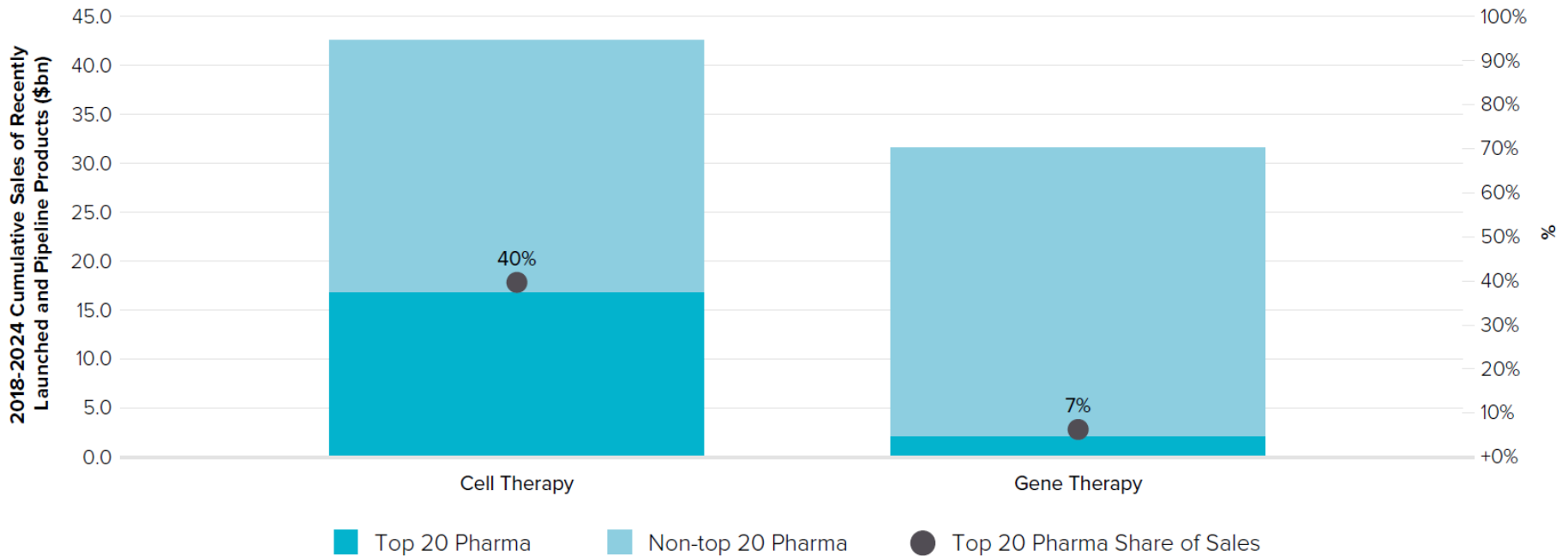


(자료: 한국제약바이오협회)

바이오의약품시장의 성장과 특징(2)

Value Creation from Advanced Therapies

Source: Evaluate, May 2018

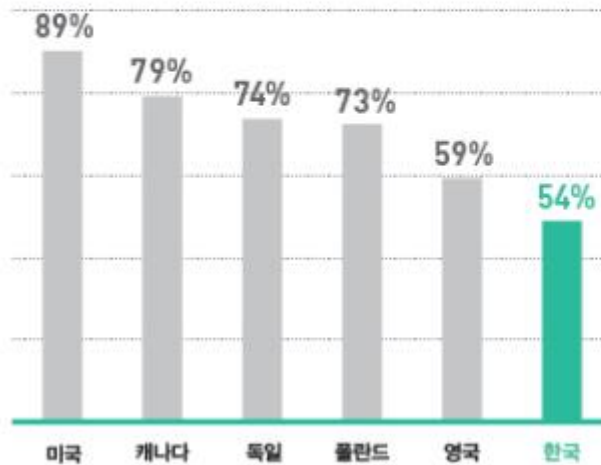


제네릭(바이오시밀러)시장의 가능성(1)

주요 국가별

제네릭의약품 사용 비중

자료: IMS Health, 보건산업진흥원



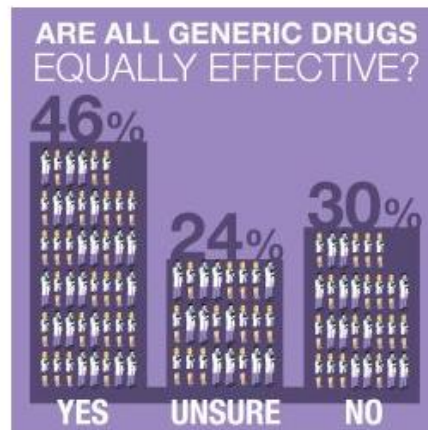
전체 의약품 중

제네릭의약품 비중 추이

자료: IMS Health, 보건산업진흥원



(자료: 제약협회)



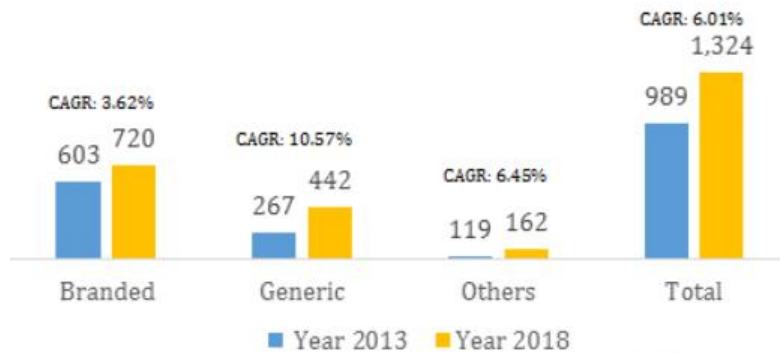
미국 의사들 84%가 바이오시밀러를 더 처방하겠다고 응답 (2016.11)

(2016.12)

제네릭(바이오시밀러)시장의 가능성(2)

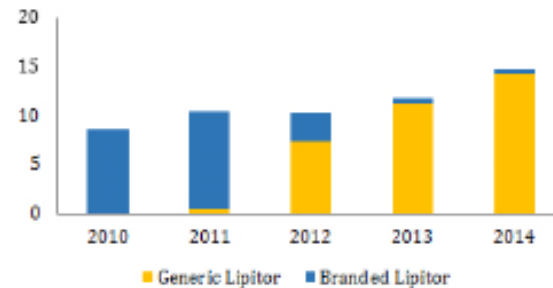
Branded vs. Generic

Global Pharmaceutical Sales (\$ billion)



Source: IMS Health

Annual Sales Lipitor (\$ billion)



Source: Bloomberg Industries

제네릭(바이오시밀러)시장의 가능성(3)



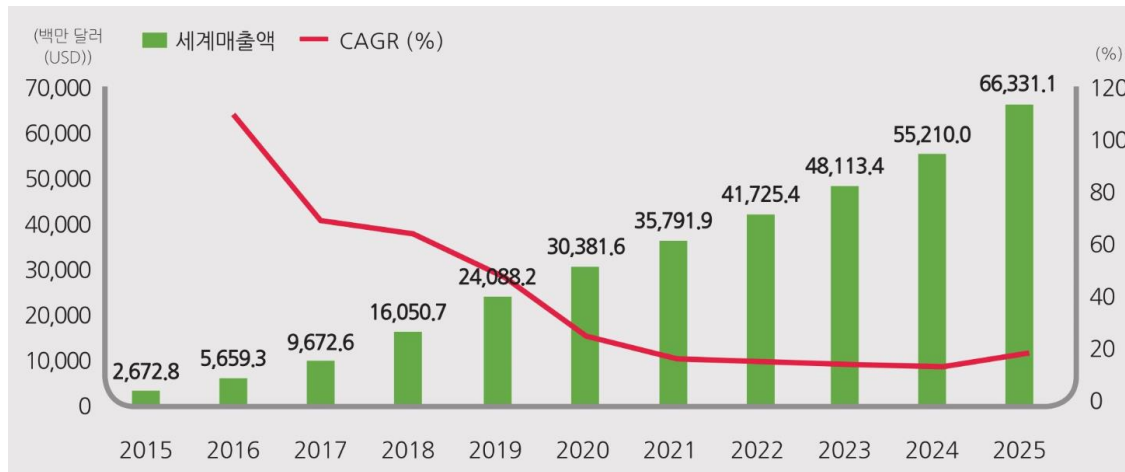
< 한국 2개사 점유율 >

2015년: 21%(20.8%)

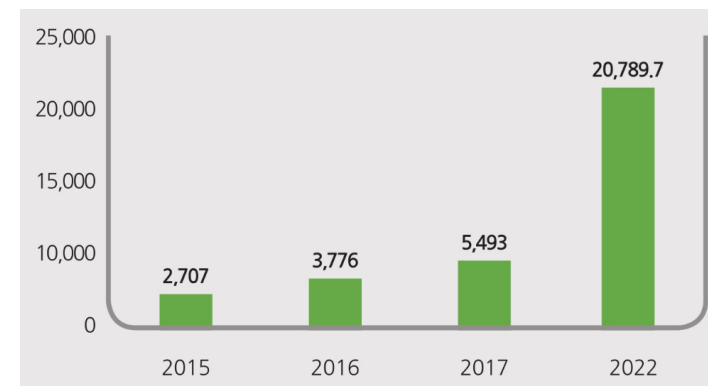
2016년: 16%(24.5%)

2017년: 15%(26.6%)

한국바이오경제연구센터 (2018)

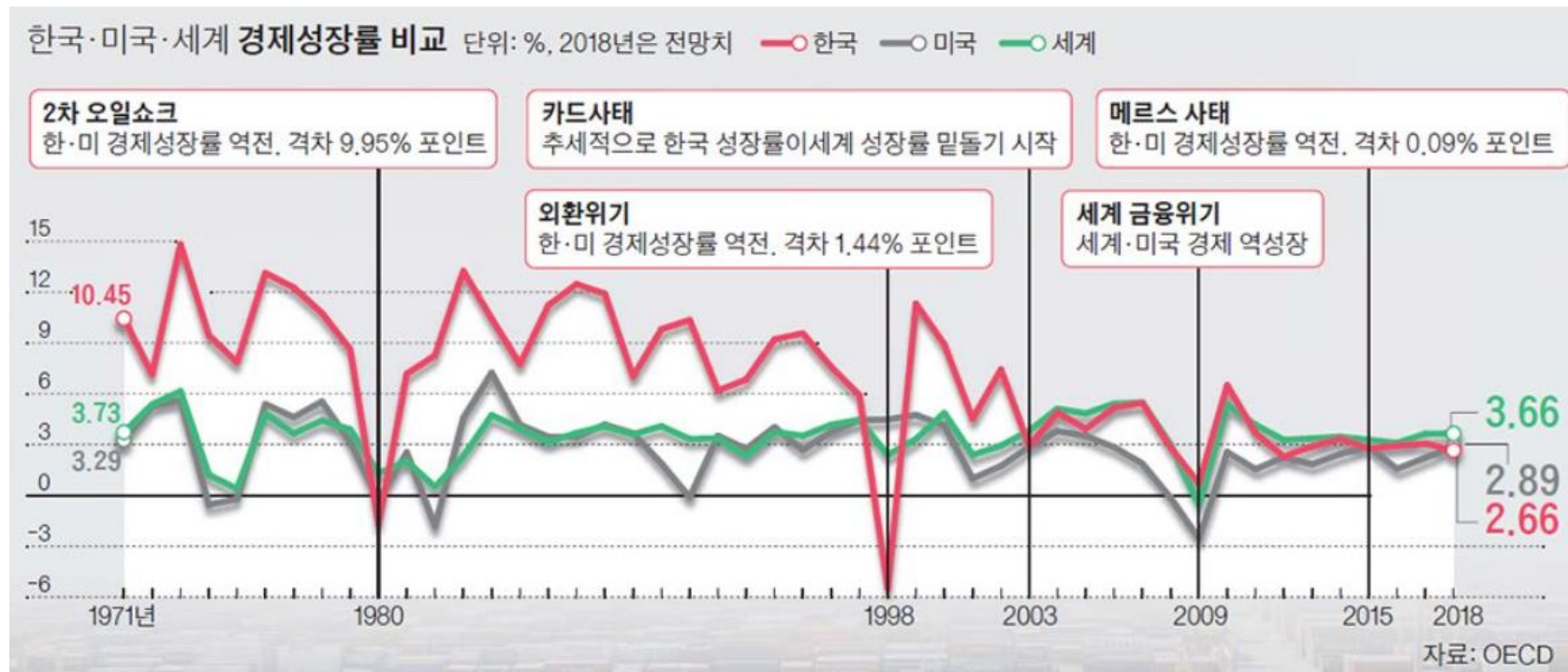


Frost & Sullivan (2018)



BCC Research (2018)

한국 경제와 바이오헬스산업?



*1차 (-) 성장 : 1980년 -1.89%

*2차 (-) 성장 : 1998년 -5.71%

Data Industry: Next Growth Engine!

(Data Economy?)

Data is the new basis of competitive advantage

By 2017 there will be more than **1 trillion** connected objects and devices on the planet generating data.

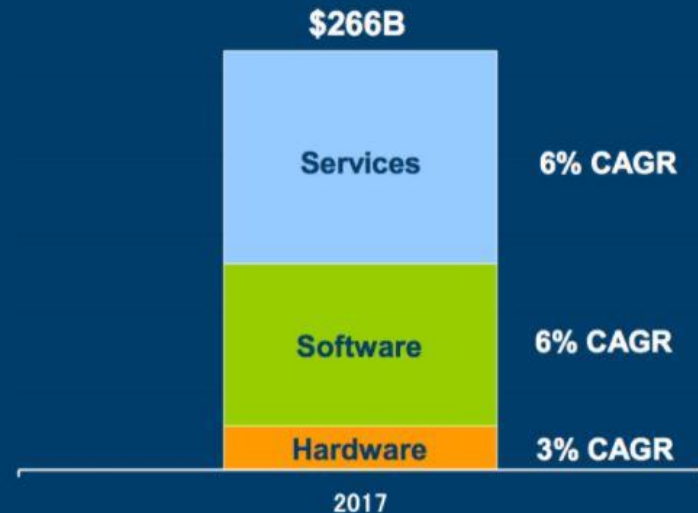
There are **2.5 billion** gigabytes of data generated every day...

of which **80%** is unstructured.

By 2017, WW data spend will be **\$266B.**

Big Data & Analytics Market Opportunity

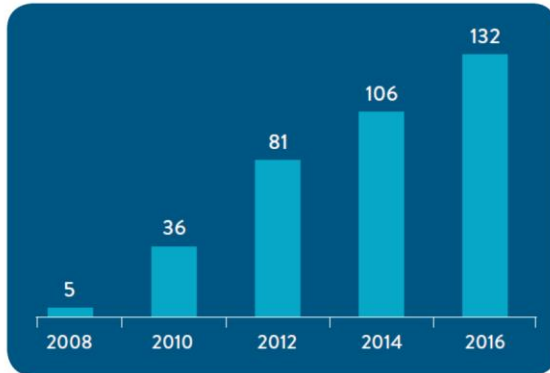
6% CAGR through 2017



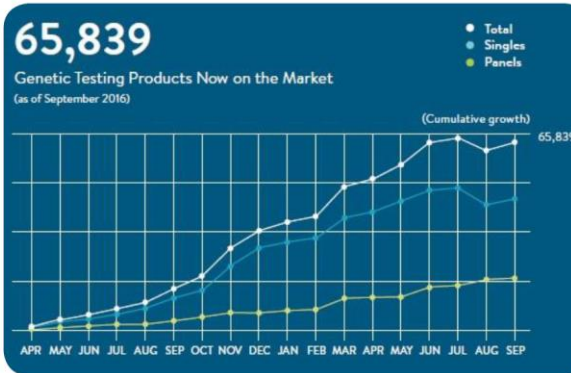
맞춤의료 시장의 확대

*IT혁명: PC \$1,000 vs. BT혁명: Genome \$1,000

맞춤의약품수



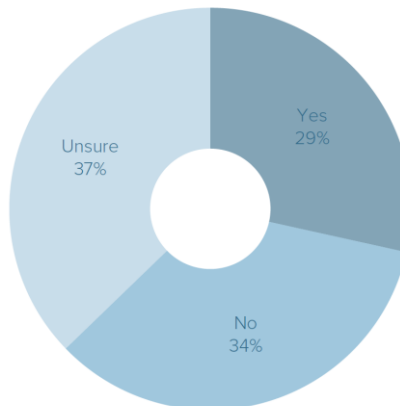
출시된 유전자검사 제품수



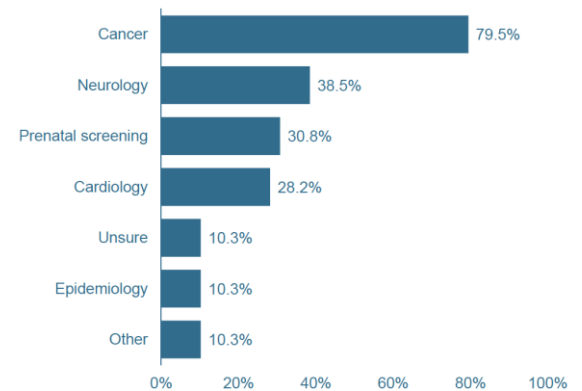
출처: Personalized Medicine Coalition. The Personalized Medicine Report 2017—Opportunity, Challenges, and the future, 2017.

정밀의료 수행 여부?

미국 의료진 137명 대상 설문조사
(대학병원 13.1%, 다병원헬스시스템 35.8% 등)



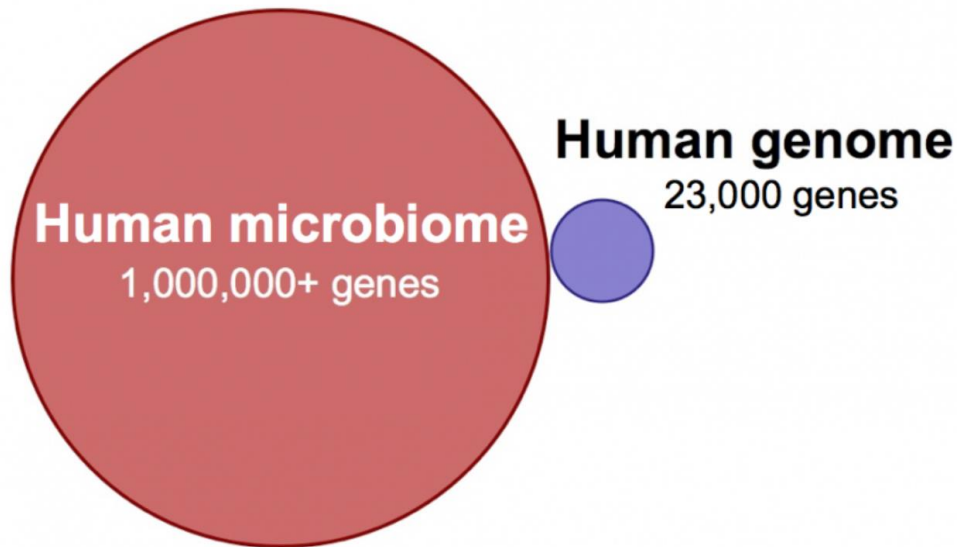
적용 분야?



Source: 2016 HIMSS Analytics Precision Medicine Study (N=39)

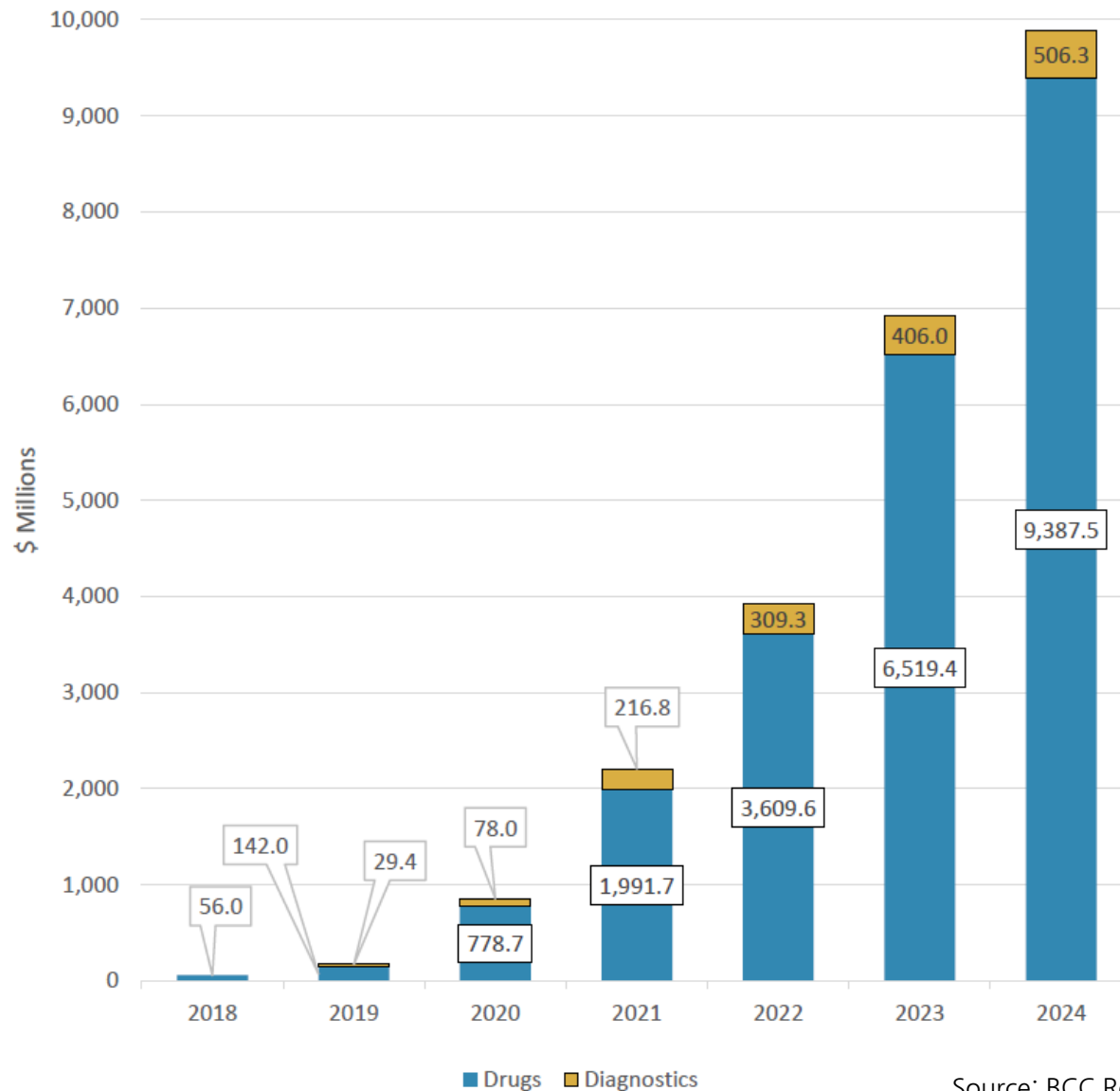
Microbiome (2nd Genome) vs. Genome

Your body has 10 times as many Microbe cells as Human cells.



**99% of your DNA genes
are in Microbe cells
not Human cells**

Microbiome (2nd Genome) based Global Market



Source: BCC Research (2017)

Collaboration of Microbiome-based Companies

Industry collaborations in Microbiome-based Companies
(\$ Millions)

Microbiome Company	Partner	Initial Investment	Deal Type
Seres Therapeutics	Nestle Health	120.0	Clostridium difficle infection
Vedanta Biosciences	Johnson & Johnson	240.0	Irritable bowel disorders
Enterome Biosciences	Bristol-Meyers Squibb	12.0	Immuno-oncology and cancer
Enterome Biosciences	Abbvie	Undisclosed	Gastrointestinal disorders
Enterome Bioscience	Takeda	Undisclosed	Gastrointestinal disorders
Second Genome	Johnson & Johnson	Undisclosed	Research deal to characterize bacteria in ulcerative colitis to identify potential drug targets
Second Genome	Pfizer	Undisclosed	Research for obesity drug targets
Synlogic Inc.	AbbVie	Undisclosed	Develop synthetic biotics for the treatment of Crohn's disease and ulcerative colitis.

Source: BCC Research

Microbiome-based Drugs in Development for Cancer, Obesity, and Diabetes

Cancer

Drug	Company	Phase	Indication
MicAbodies	AvidBiotics	Preclinical	Solid tumors
Oncobiotics	Evelo Biosciences	Preclinical	Solid tumors
SER 155	Seres Therapeutics	Phase I	Stem cell transplantation
SGM compound	Symberix	Preclinical	Chemotherapy induced toxicity
MRX 581	4D Pharma	Preclinical	Solid tumors
AG 013	Intrexon	Phase II	Oral mucositis

Obesity

Drug	Company	Phase	Indication
NM-504	Microbiome Therapeutics	Phase IIb	Obesity, obesity in type 2 diabetes
NM-313	Microbiome Therapeutics	Preclinical	Obesity
Fecal microbial transplant therapy	Seres Therapeutics	Preclinical	Obesity

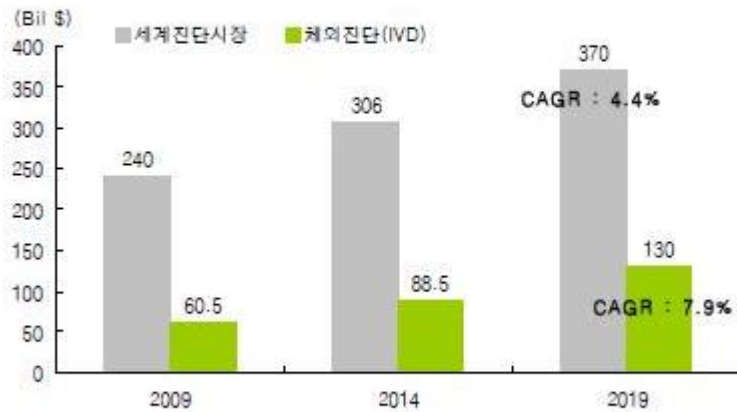
Type 2 Diabetes

Drug	Company	Phase
NM-504	Microbiome Therapeutics	Phase IIb
CP-001	Caelus Health	Phase I
Bovine colostrum product	Immuron	Preclinical
Second Genome diabetes program	Second Genome	Preclinical
Seres diabetes program	Seres Therapeutics	Preclinical

Source: BCC Research (2017)

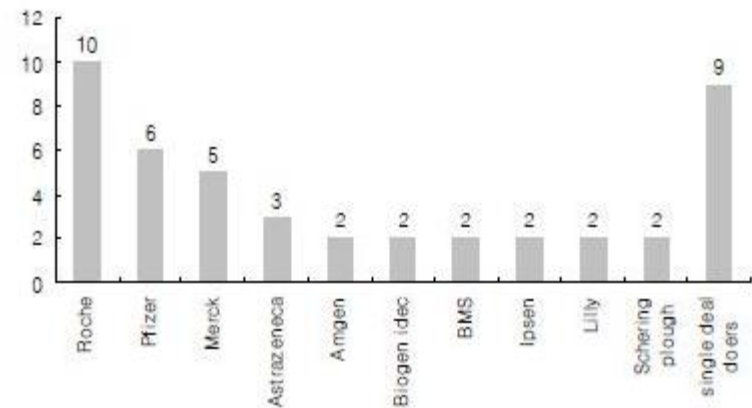
진단 시장

진단시장은 향후 10년동안 4.4%, 체외진단은 8% 성장할 전망







자료: Jain PharmaBiotech, 대신증권 리서치센터

2004-2008 다국적제약사들과 진단회사들과의 Deal 건수



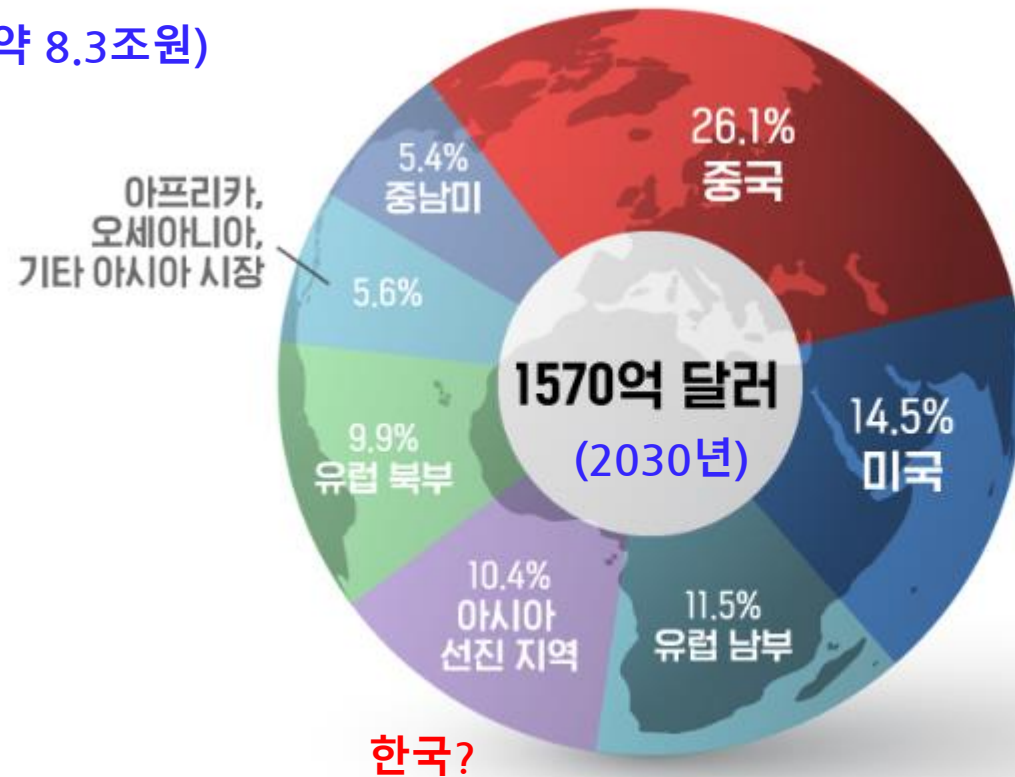
자료: 언론자료, 대신증권 리서치센터

국내외 줄기세포 치료제 인수 및 제휴 현황

구분	기업	대상업체(기관)	일자	세부내용
해외		Pervasis Therapeutics	2012. 04	Pervasis Therapeutics의 모든 자산을 인수, Shire의 임상활동, 규제 및 판매목표 기반의 예상비용을 선불로 제공
		Healthpoint	2012. 11	생물작용 상처치료제 업체인 Healthpoint를 7.82억 달러에 인수
		Osiris	2013. 10	오시리스의 줄기세포 사업부문 인수
		Celluar Dynamics	2014. 03	유도 만능줄기세포(iPS) 신약개발사업 인수
		교토대(일)	2014. 09	2년간 역분화 줄기세포(iPS) 연구 지원
		Gamida Cell	2014. 08	NiCord 개발 관련 3,500만 달러 지분투자
		OCATA (Advanced Cell Tech.)	2015. 11	3억 7900만 달러에 인수해 2014년에 세운 재생의학부문 계열사를 보강
국내		강스템바이오텍	2015. 01	퓨어스템 국내외 독점 판매, 공동개발 계약
		파미셀	2013. 07	하티셀그램-AMI 공급계약 및 임상 중 제품에 대한 독점 판매계약
		메디포스트	2010. 12	카티스템 국내 판권 양수도 계약

AI 시장

*2018년, 73.5억달러(약 8.3조원)



출처 : PwC 글로벌 AI 연구(2017)

AI Trends



NExTT Trends

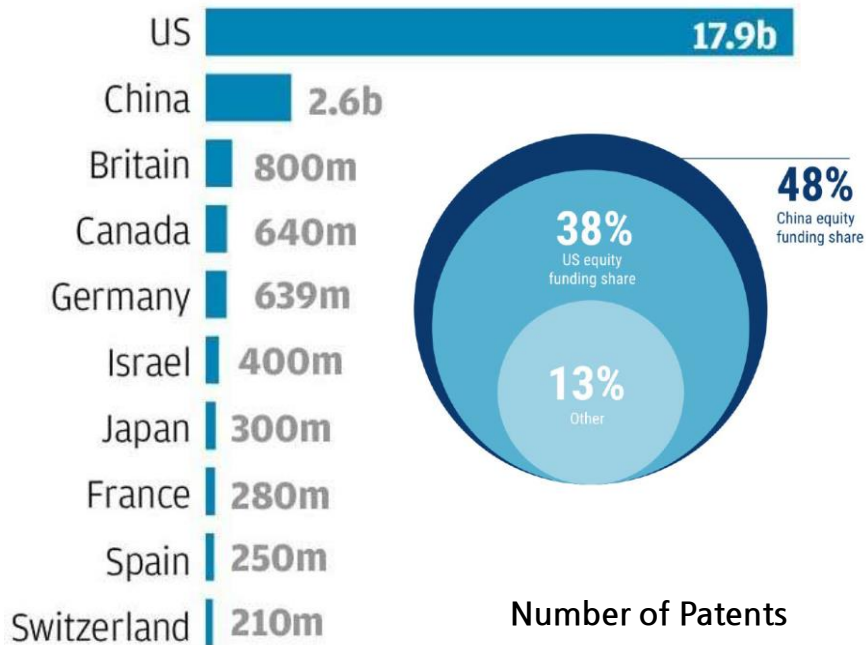
INDUSTRY ADOPTION	High	TRANSITORY Trends seeing adoption but where there is uncertainty about market opportunity. As Transitory trends become more broadly understood, they may reveal additional opportunities and markets.	NECESSARY Trends which are seeing widespread industry and customer implementation / adoption and where market and applications are understood. For these trends, incumbents should have a clear, articulated strategy and initiatives.
	Low	EXPERIMENTAL Conceptual or early-stage trends with few functional products and which have not seen widespread adoption. Experimental trends are already spurring early media interest and proof-of-concepts.	THREATENING Large addressable market forecasts and notable investment activity. The trend has been embraced by early adopters and may be on the precipice of gaining widespread industry or customer adoption.
		Low	High
		MARKET STRENGTH	

- Application: Computer vision
- Application: Natural language processing/synthesis
- Application: Predictive intelligence
- Architecture
- Infrastructure

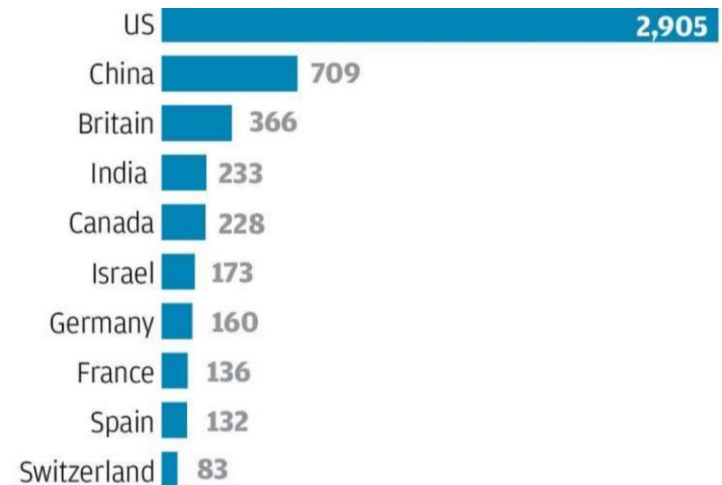
CB Insights (2019)

AI 경쟁력

Size of Financing (Q1 2012-Q2 2016) (US\$)

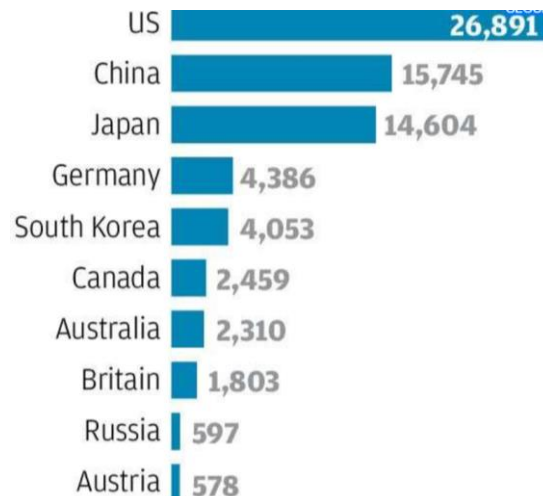


Number of Companies

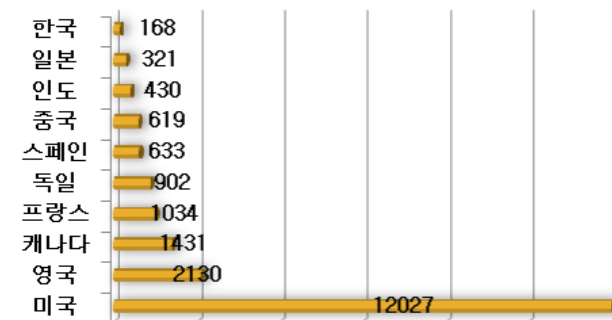


CB Insight (2018)

Number of Patents



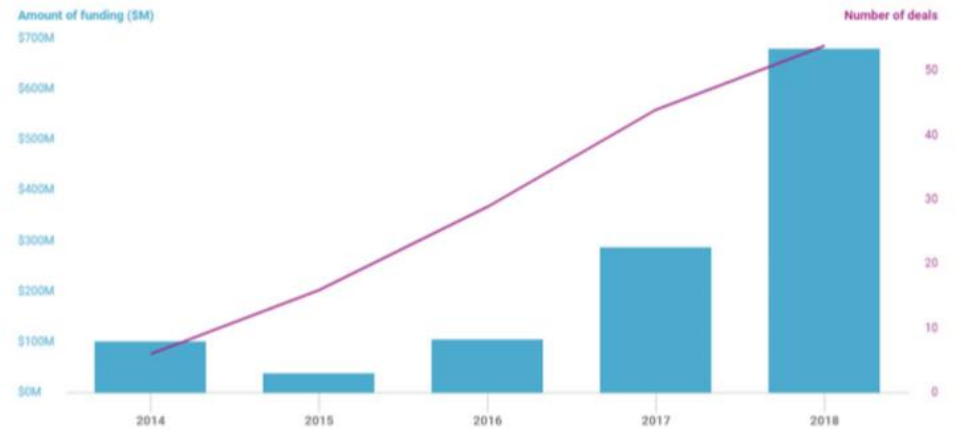
국가별 인공지능 전문가 수 TOP10(명)



맥킨지글로벌연구소(2018)

Diagnostics, a major driver of Health AI deals

Equity deals, 2014 – 2018

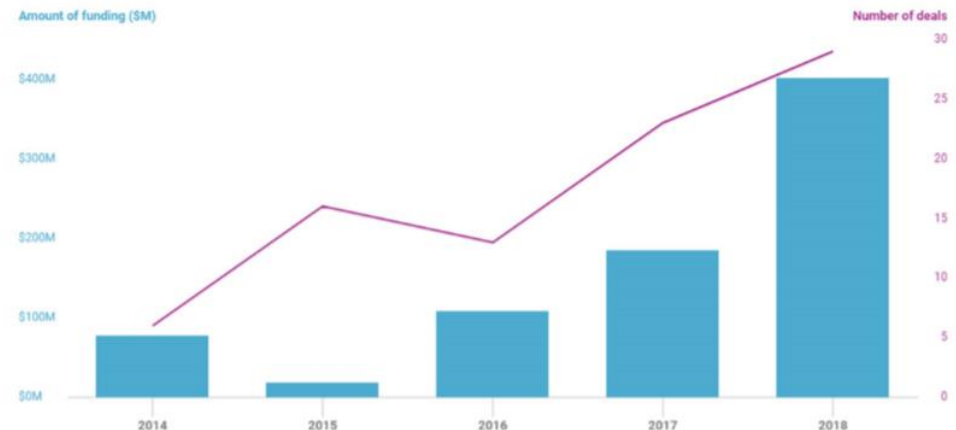


Source: CB Insights

CBINSIGHTS

Big pharma's interest boosts AI drug discovery deals

Equity deals, 2014 – 2018



Source: CB Insights

CBINSIGHTS

AI & Drug Development

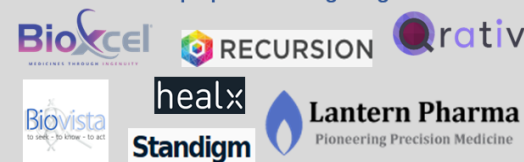
1. Aggregate and Synthesize Information



2. Understand Mechanisms of Disease



3. Repurpose Existing Drugs



4. Generate Novel Drug Candidates



5. Validate Drug Candidates



6. Design Drugs



7. Design Preclinical Experiments



8. Run Preclinical Experiments



9. Design Clinical Trials



10. Recruit for Clinical Trials



11. Optimize Clinical Trials



12. Publish Data



Bio-Health Innovation? Data Innovation!

(Genome/Microbiome, Clinical data, Lifestyle data, etc.)

Precised treatment

Why Precision Medicine?



Increases survival rates



Targets tumors with greater accuracy



Mitigates unnecessary treatments



Reduces prescription errors

Preventive management



**DIGITAL
HEALTHCARE**

Clinical innovation (AI aid)



BenevolentAI

Standigm



Confidential Project
Merck



[시장확대] 아시아 시장 진출 확대

Business Development in Asia (with ES/EU)



WHY BUSINESS DEVELOPMENT IN ASIA

The center of gravity of the world's economy is rapidly shifting towards Asia.

**Source: Merenlender*

Middle-class Population as Game Changer

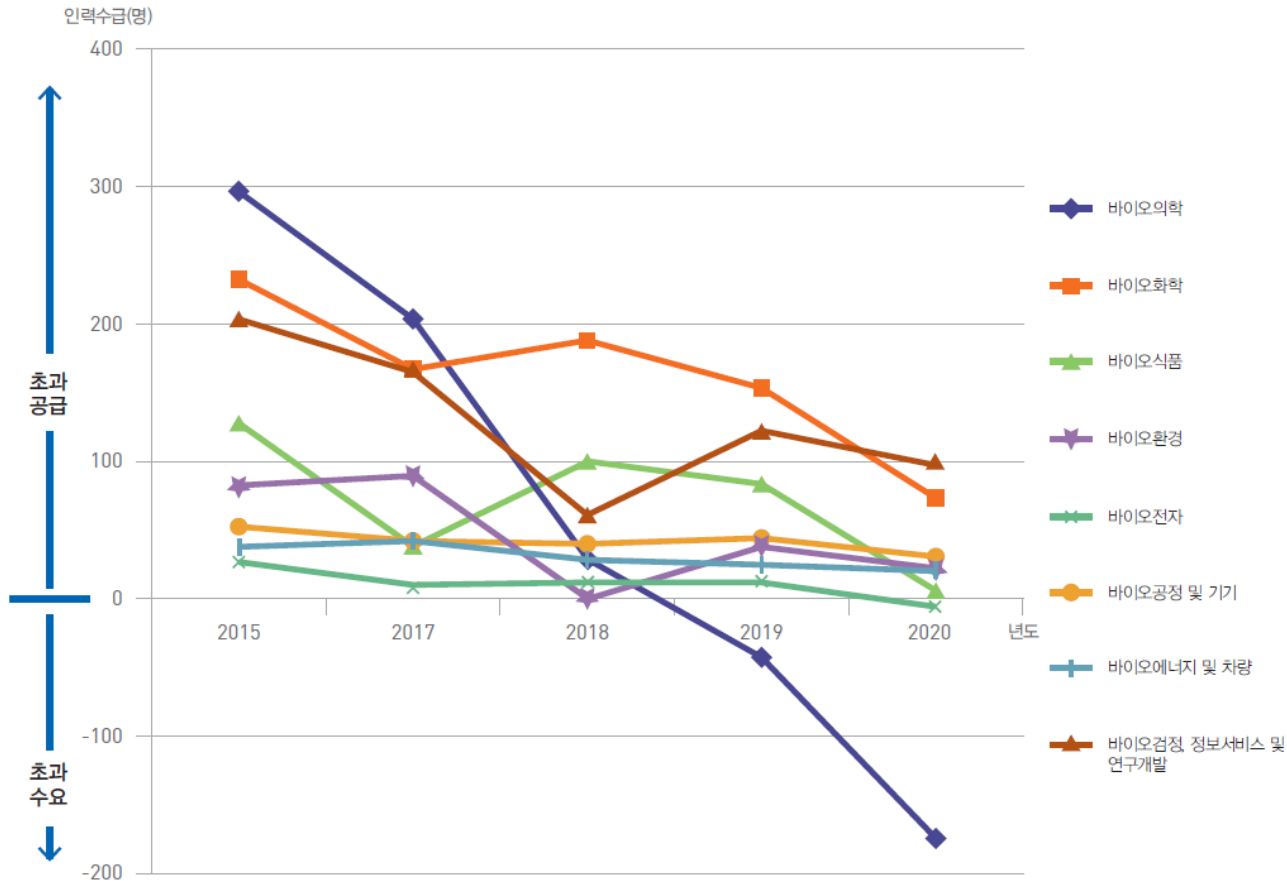
: 1.8bn (28%, 2016) → 3.2 (54%, 2020) → 4.9 (66%, 2030)

(2/3 of middle-class population in Asia)

**Source: OECD/GFK*



[인력] 미스매치 해결해야!



<기술>

AI

Data Scientist

Microbiome

Global BD

<수요/공급 구조>

대학-[출연연]-기업을

연결하는 지속가능한

HR 연결 생태계 구축

(바이오기술 인력 초과공급 전망, KISTEP Ini 9호, KISTEP)

[창업1] 성공요인 5

Top 5 Factors in Success Across More Than 200 Companies



Timing



Team / Execution



Idea “Truth” Outlier



Business Model



Funding

??

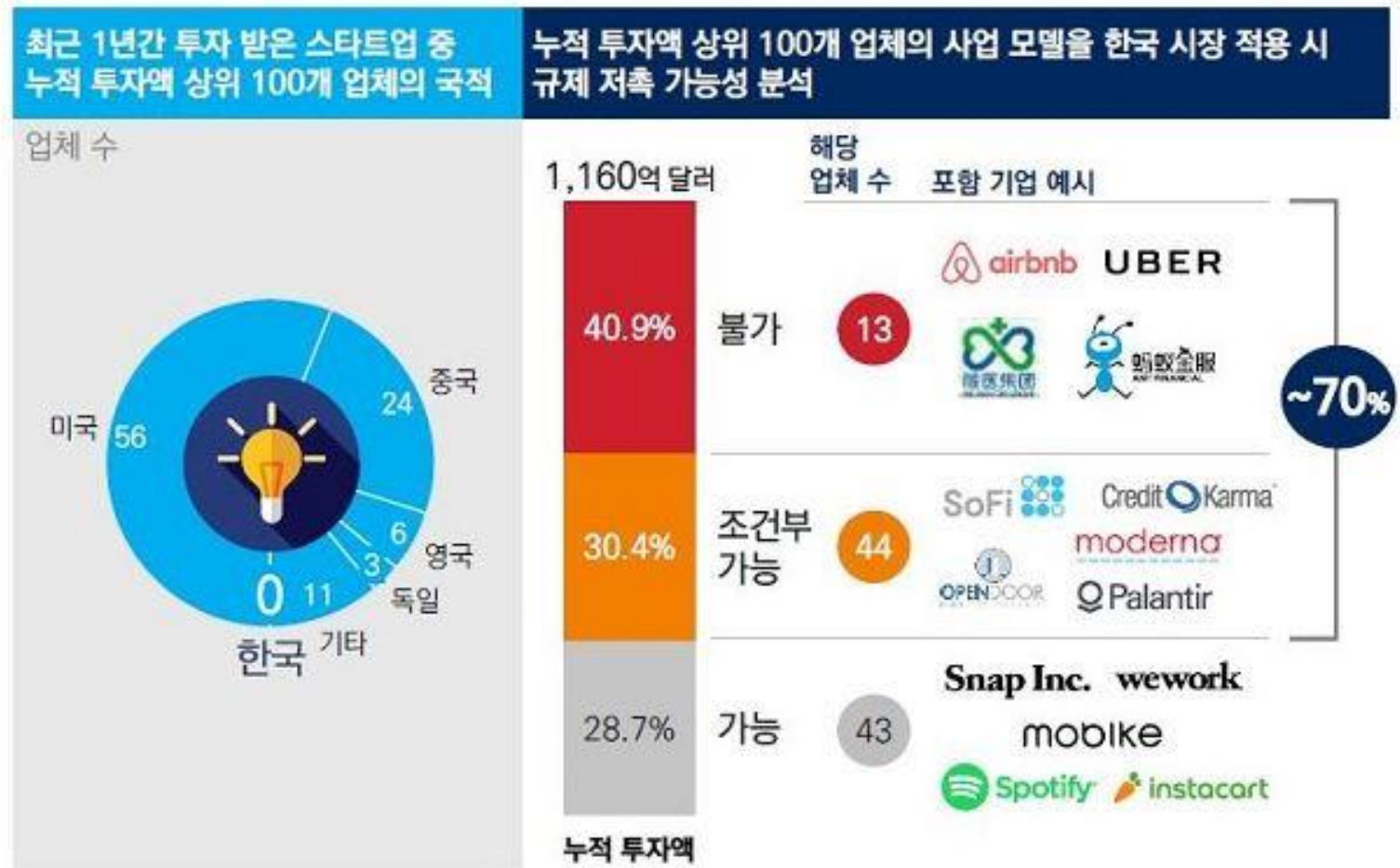
Source: “The single biggest reason why startups succeed” by Bill Gross @ TED

[창업2] 초기투자

2015		초기(3년미만)	중기(3~7년)	후기(7년이상)	합계
전체	금액(억원)	6,472	5,828	8,558	20,858
	비중(%)	31.1	27.9	41.0	100.0
바이오/의료	금액(억원)	385	1,007	1,778	3,170
	비중(%)	12.3	32.1	55.6	100.0
ICT서비스	금액(억원)	1,750	1,342	927	4,019
	비중(%)	43.5	33.4	23.1	100.0
2014		초기(3년미만)	중기(3~7년)	후기(7년이상)	합계
전체	금액(억원)	5,045	4,069	7,279	16,393
	비중(%)	30.8	24.8	44.4	100.0
바이오/의료	금액(억원)	356	537	2,034	2,928
	비중(%)	12.2	18.4	69.5	100.0
ICT서비스	금액(억원)	595	446	871	1,913
	비중(%)	31.1	23.3	45.6	100.0
2013		초기(3년미만)	중기(3~7년)	후기(7년이상)	합계
전체	금액(억원)	3,699	3,259	6,887	13,845
	비중(%)	26.7	23.5	49.8	100.0
바이오/의료	금액(억원)	136	491	896	1,469
	비중(%)	9.3	29.5	61.2	100.0
ICT서비스	금액(억원)	652	255	665	1,553
	비중(%)	40.7	16.4	42.9	100.0

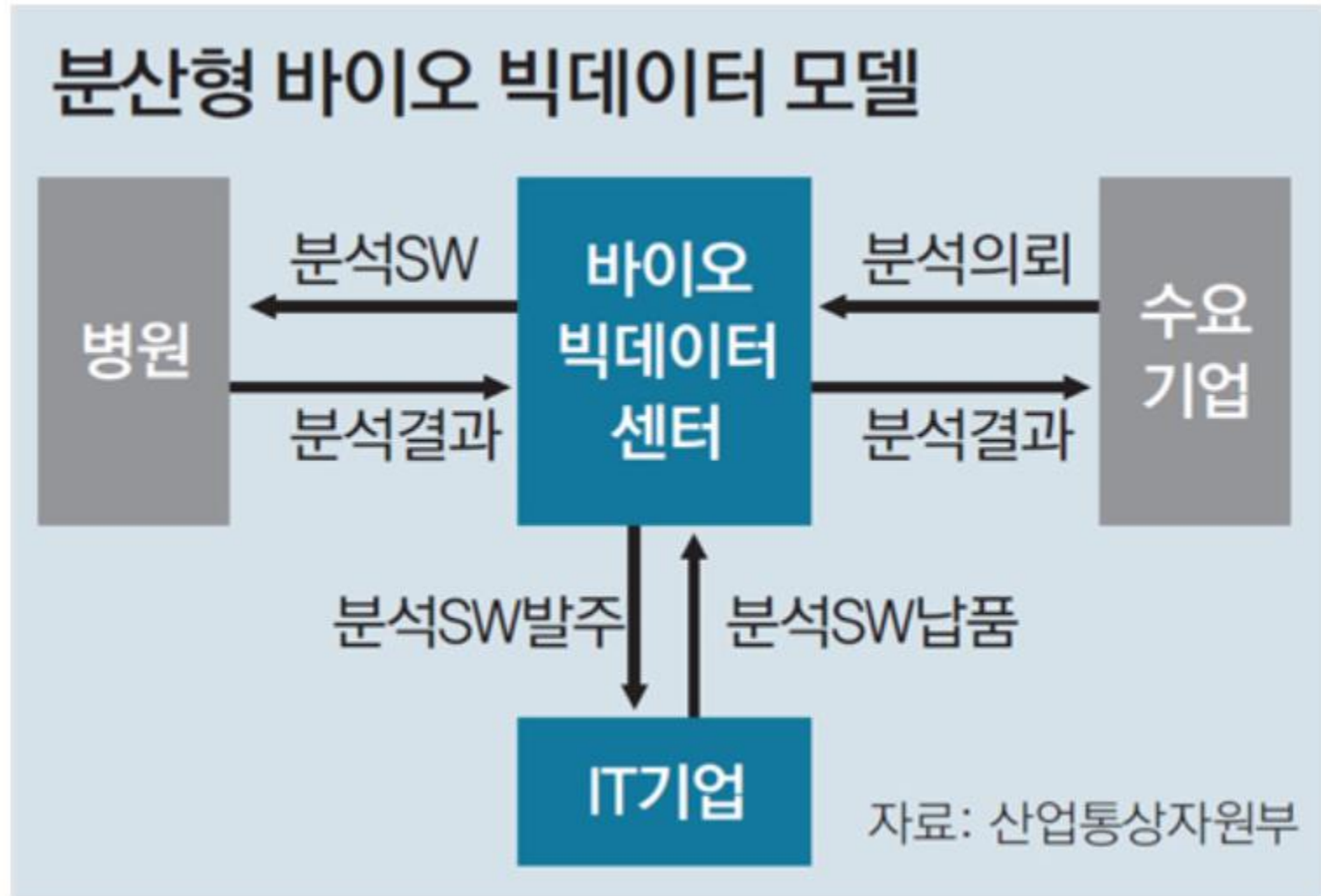
Stage	Number of Deals	Number of Companies	Total VC Investments (\$ Millions)	Average Per Deal (\$ Millions)	Average Investment Per Company in (\$ Millions)
Start-Up/Seed	388	308	\$1,919	\$4.95	\$6.23
Early Stage	1,974	1,114	\$17,799	\$9.02	\$15.98
Expansion	803	477	\$7,270	\$9.05	\$15.24
Later Stage	2,427	1,167	\$15,485	\$6.38	\$13.27
Buyout or Acquisition	157	121	\$2,223	\$14.16	\$18.37
Other	202	153	\$4,046	\$20.03	\$26.44
Grand Total	5,951	3,340	\$48,742	\$8.19	\$14.59

[창업3] 규제 Global Top100 Startups 71.3%, : difficult business in Korea



자료 : Pitchbook, 테크앤로 법률 검토 결과

[병원의 혁신] 병원과 기업이 협력해야!



Biocluster Ecosystem Innovation

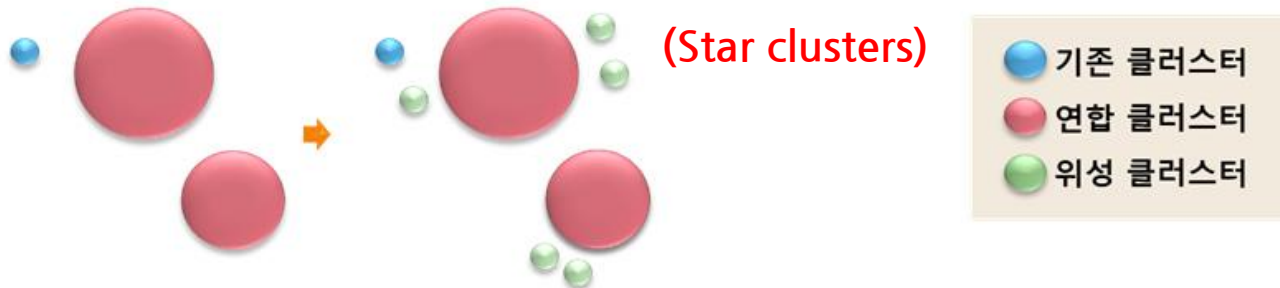
Research/Clinical Innovation
+ Smart Regulation
+ Collaborative Innovation
+ Global BD
+ Emerging Tech HR

1단계: 기존 클러스터 간 연합 클러스터의 조성 (임계 규모 달성)



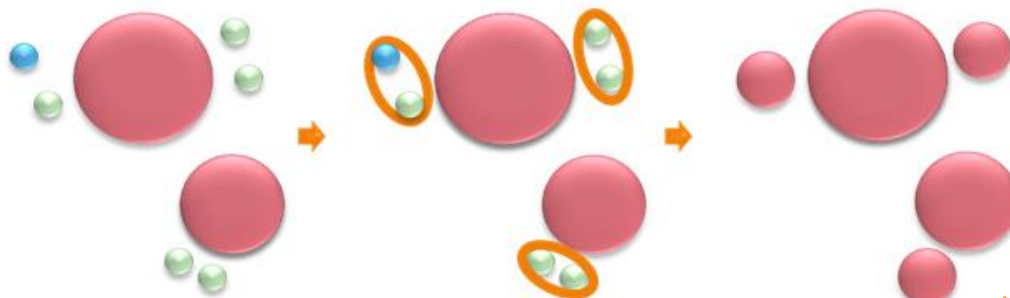
(Inter-region cluster: Critical mass)

2단계: 연합 클러스터 주위에 위성 클러스터 생성



(Star clusters)

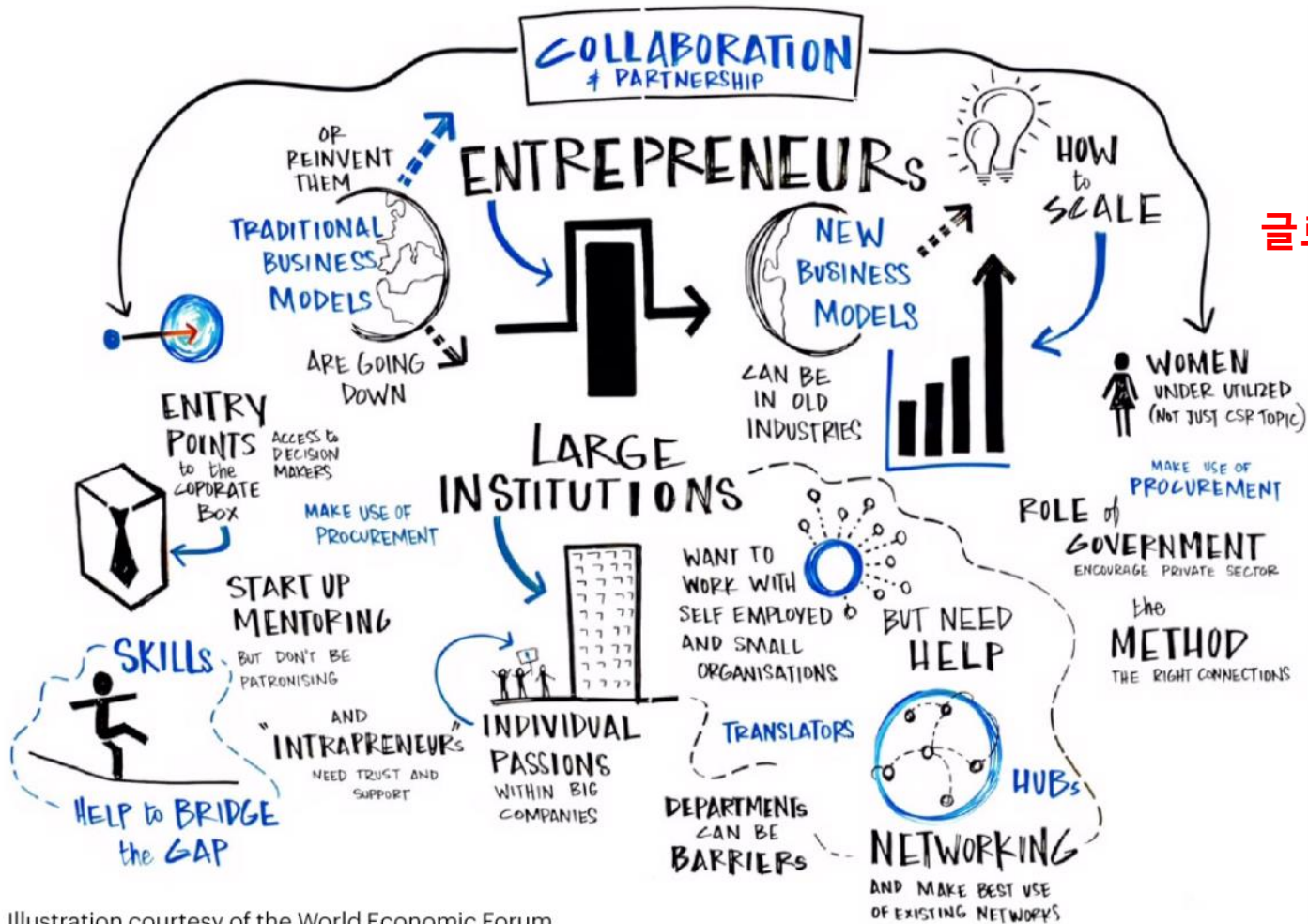
3단계: 위성 클러스터 포함 새로운 연합 클러스터 조성



(2nd Inter-region cluster: Expansion)

◆ International Inter-region cluster

Open & Collaborative Innovation



글로벌 임상펀드 조성?

Illustration courtesy of the World Economic Forum



Technology & People *for Connected Healthcare*

고맙습니다!

biojun@technpeople.com

