Genexine

MAKE
INCURABLE
CURABLE

ToolGen

INNOVATE
GENOME

Company Information

July 2019

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Why & Why Now

The Age of Gene Therapy is here.

"Gene therapy, cell & gene therapy, forecasted to go through "inflection point' to grow into mainstream therapeutic modalities in 5 years time" (expected CAGR 58% to 2024)

April 2019, McKinsey & Company

ToolGenexine Outlook

Lymphopenia Drug
(Hyleukin-7)

HPV+ Cancer
(GX-188, 140, 200)

Bi- & Tri-specific Ab

- Cancer,
- autoimmune disease
- Metabolic disease

Genome editing

hFc platform & Ab Engineering

Know-how in CMC & clinical development

Cell & gene therapeutics

- allogeneic CAR-T
- eDC vaccine
- AIDS etc.

In Vivo Gene therapeutics

- Wet AMD, CMT1A Hemophilia B

Turning incurable CURABLE

with innovative and diversified therapeutic Platforms

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Genexine Clinical Development

Maximize the Value of New Drugs and Secure the Cash cow through Bio-Better Drugs

GX Pipelines in Development

Best-in-Class

Late Stage (Phase 2b-3)

- **GX-E2** (EPO-hyFc)
- **GX-G3** (G-CSF-hyFc)
- **GX-H9** (hGH-hyFc)

Early Stage (Phase 1- 2a)

- **GX-G6** (GLP-1-hyFc)
- **GX-G8** (GLP-2-hyFc)

First-in-Class

Early Stage (Phase 1- 2a)

- **HyLeukin-7 (IL-7-hyFc)**
  (Immuno-Oncology)
- **GX-188 (GX-200, -140)***
  (Cervical Pre-Cancer/Cancer DNA Vaccine)

*** 2nd Generation Pipeline**

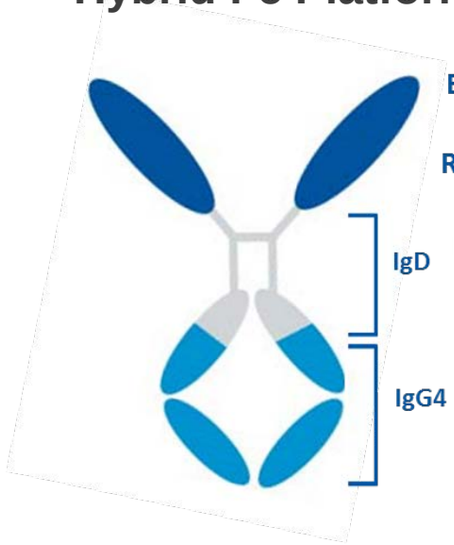
Preclinical Stage

- **Multi-Target Antibody Drugs**
  (Immuno-Oncology)
- **GX-P1** (PD-L1-hyFc)
  (Autoimmune Diseases)

GX Pipelines in Clinical Stage

Phase 1	Phase 1b	Phase 1b/2a	Phase 2	Phase 3
GX-G6 (GLP-1-hyFc) Type 2 Diabetes Mono (EU) ***Completed***	**GX-I7 (IL-7-hyFc)** Solid Tumor Mono (KR) Ongoing 1b	**GX-I7 (IL-7-hyFc)** Solid Tumor CPA Pre-conditioning (KR) Ongoing 1b/2a	**GX-188E** Cervical Cancer Keytruda Combo (KR) Ongoing 1b/2	
		GX-I7 (IL-7-hyFc) Glioblastoma Mono (KR) Ongoing 1b/2a	**GX-H9 (hGH-hyFc)** AGHD Mono (EU/KR) ***Completed***	
		GX-I7 (IL-7-hyFc) Glioblastoma TMZ Combo (US) Ongoing 1b/2a	**GX-H9 (hGH-hyFc)** PGHD Mono (EU/KR) ***Completed***	
		GX-I7 (IL-7-hyFc) Skin Cancer Tecentriq Combo (US) Ongoing 1b/2a	**GX-E2 (EPO-hyFc)** CKD-induced Anemia Mono (KR) ***Completed***	
		GX-I7 (IL-7-hyFc) TNBC Keytruda Combo (KR) Ongoing 1b/2a	**GX-G3 (G-CSF-hyFc)** Neutropenia Mono (EU) ***Completed***	

Hybrid Fc Platform Technology



Broad applicability

Retained bioactivity
(flexible hinge, less steric hindrance)

No Cytotoxicity
(ADCC or CDC)

Long-acting
(FcRn-medicated recycling)

No mutation

Immuno-Oncology
DNA vaccine
Bio-better drug

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Key Summaries of major GX Pipelines

GX-H9
Long-acting Growth Hormone

- Ph2 Completed in AGHD and PGHD
  - Effective in both weekly & twice-monthly
  - Showing good annual HV even in 2nd year
  - Pediatric patients grew better in 2nd year when switched from daily to GX-H9 weekly

- L/O to Tasgen, China (I-Mab)

- PGHD Ph3 in preparation
  - China Ph3 IND by IMAB
  - Global Ph3 IND by REZOLUTE

天境生物 I-MAB BIOPHARMA REZOLUTE

GX-188E+Keytruda Combo
for Cervical Cancer

- Keynote-158 (Keytruda mono trial)
  - ORR 12.2% (12/98 advanced cervical ca.)
  - Accelerated approval by FDA as 2L

- 188E+Keytruda Combo in similar setting
  - 1 CR, 3 PR (4/10 advanced cervical ca.)
  - Recruitment for Ph2 stage 2 initiated

- L/O to National Onco Venture
  - In collaboration for Global L/O

- Other HPV 16/18 type-induced cancers
  - GX-188E*(200) in Ph1b in cervical cancer
  - HPV 16-positive HNSCC IND in prep

MERCK National OncoVenture

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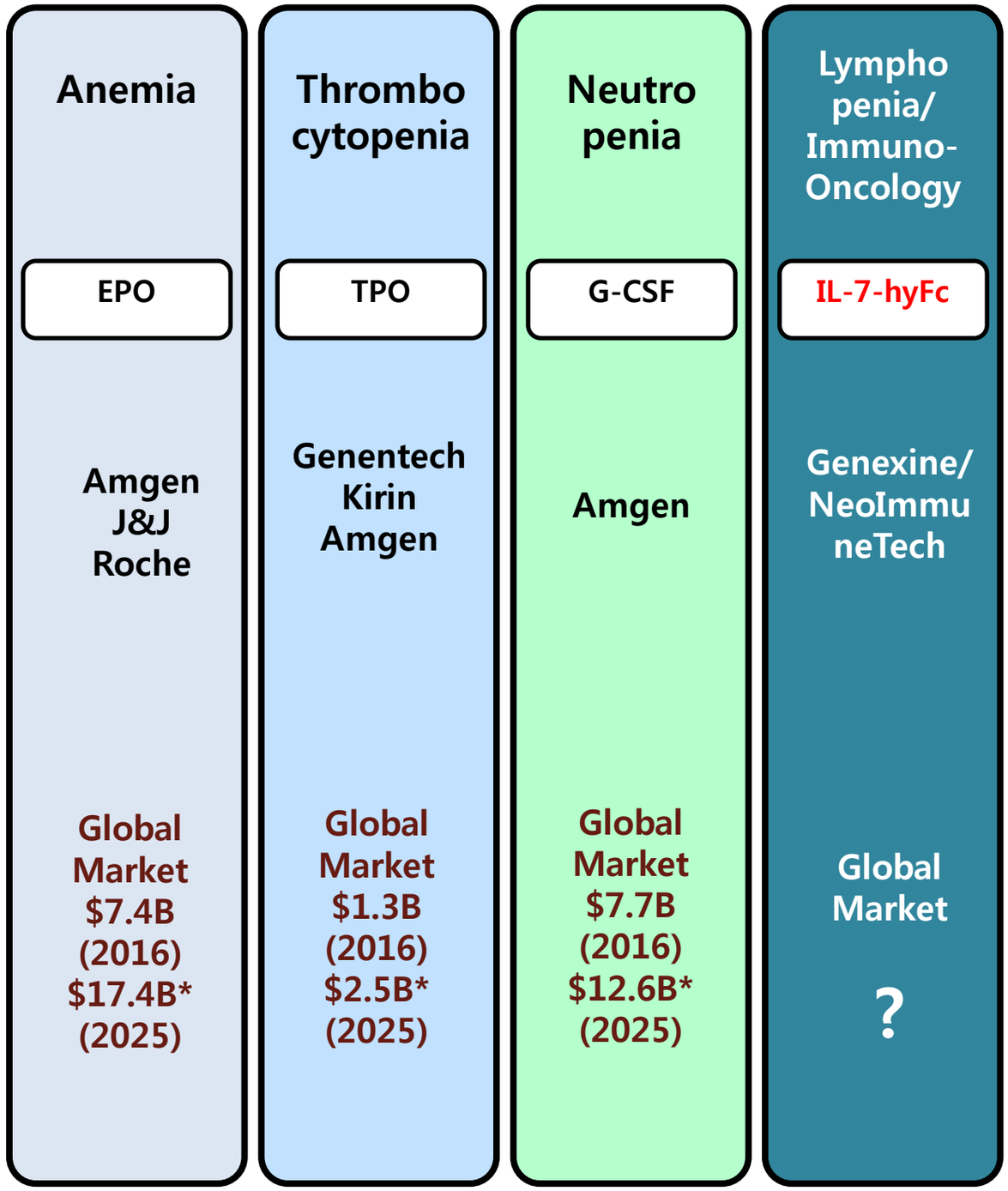
Key Summaries of major GX Pipelines

HyLeukin-7
Immuno-Oncology Blockbuster

- Patients with Lymphopenia show poor treatment outcome (shorter OS)
  [Delyon J. et. al. Annals of Oncology. 24: 1697-1703. 2013]
- Hyleukin-7 increases T cell subsets dose-dependently but not Treg in end-stage cancer patients
- Hyleukin-7 is safe and well-tolerated
- Combo with immune checkpoint blockade
  - TNBC with pembrolizumab MERCK
  - Skin cancers with atezolizumab Roche
- L/O to IMAB (China)



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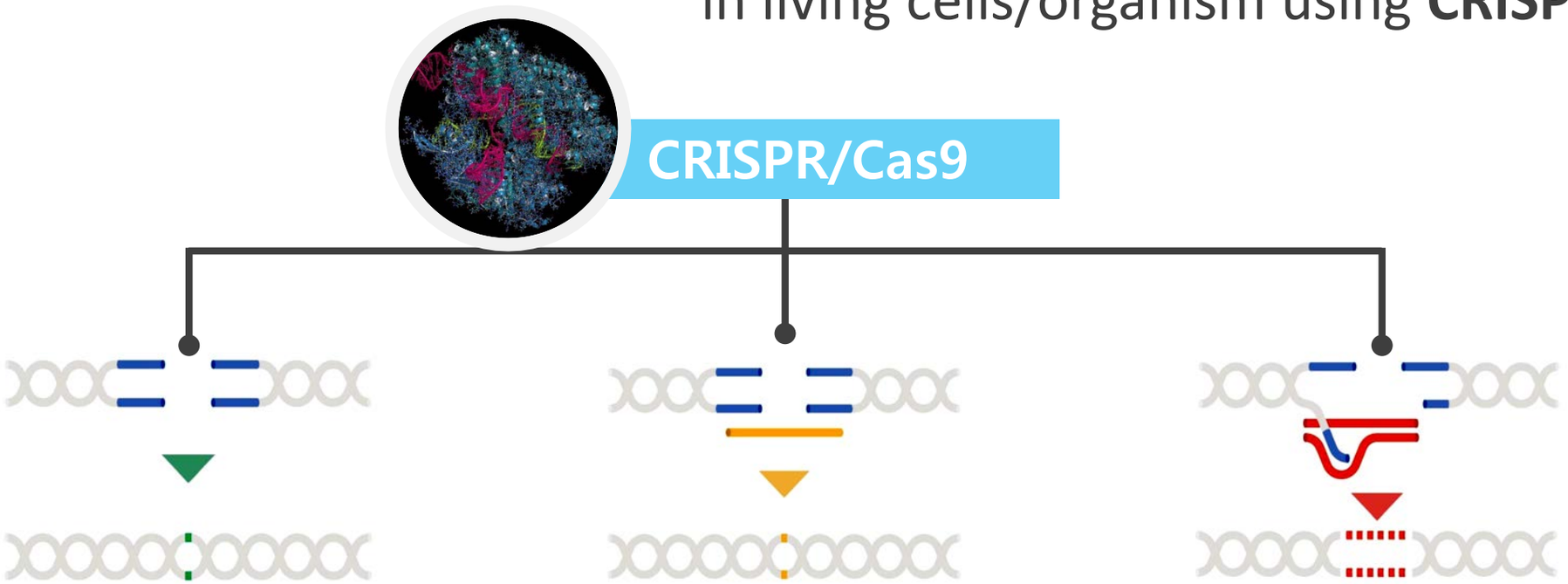
ToolGen's Technology & IP

*CRISPR/Cas9 is an **innovative genome editing technology transforming** various bio-industries ranging from **therapeutics** to agrisciences.*

Genome Editing Technology

Efficient and precise genome editing
in living cells/organism using **CRISPR/Cas9**



FIELDS

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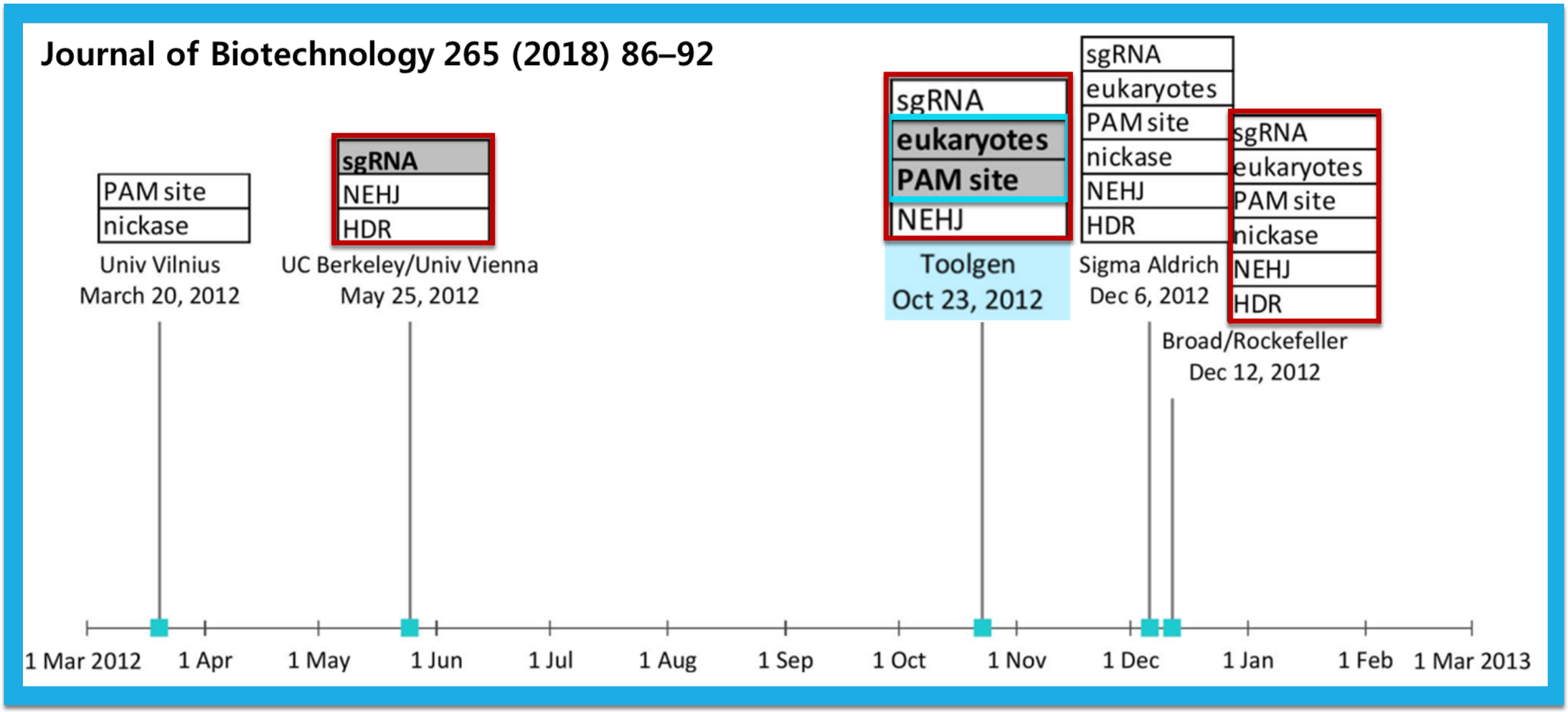
Patent Landscape of CRISPR Gene Editing Technology

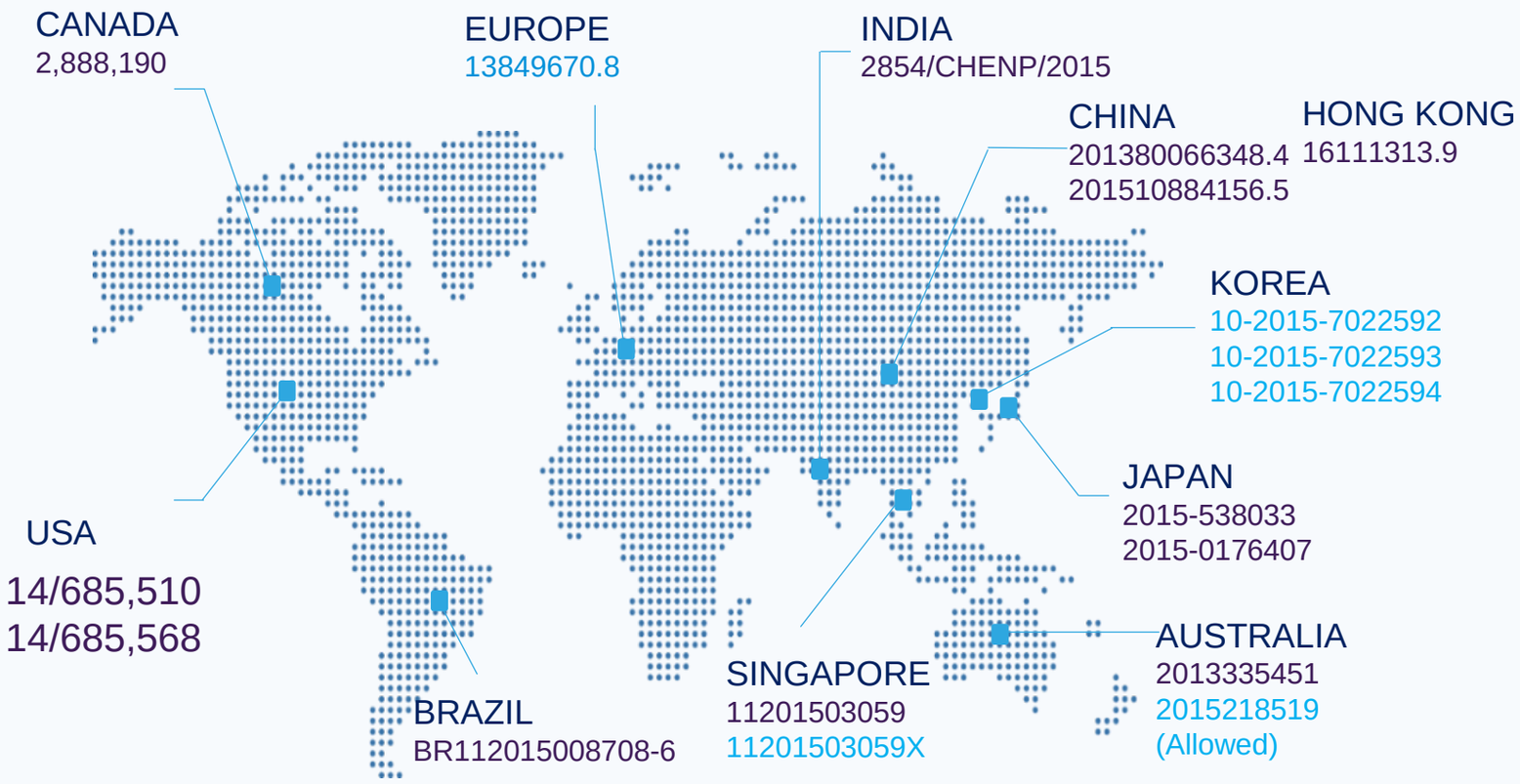
First patent filing on genome editing in eukaryotic cells by CRISPR/Cas9

Early Priority Date + Disclosure of Crucial **Enablement**



Status and Strategy of ToolGen CRISPR IP Portfolio

Expanding Territory of Blocking Claims



PCT/KR2013/009488
(National Phase in 10 countries)

- **Australia** •2016.08 patent accepted
- **Korea** •2016.09 patent registration
- **Europe** •2018.07 patent registration
- **Singapore** •2018.11 patent registration
- **Other 7 countries** •Source technology patent applied

Expand territory: Broadening genome editing IP portfolio

Refining technology: Improving CRISPR/Cas9 for therapeutic applications

Establishing therapeutic programs: Moving to IND-enabling stages

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Valuation of BIOTECHs in CRISPR fields

CRISPR THERAPEUTICS

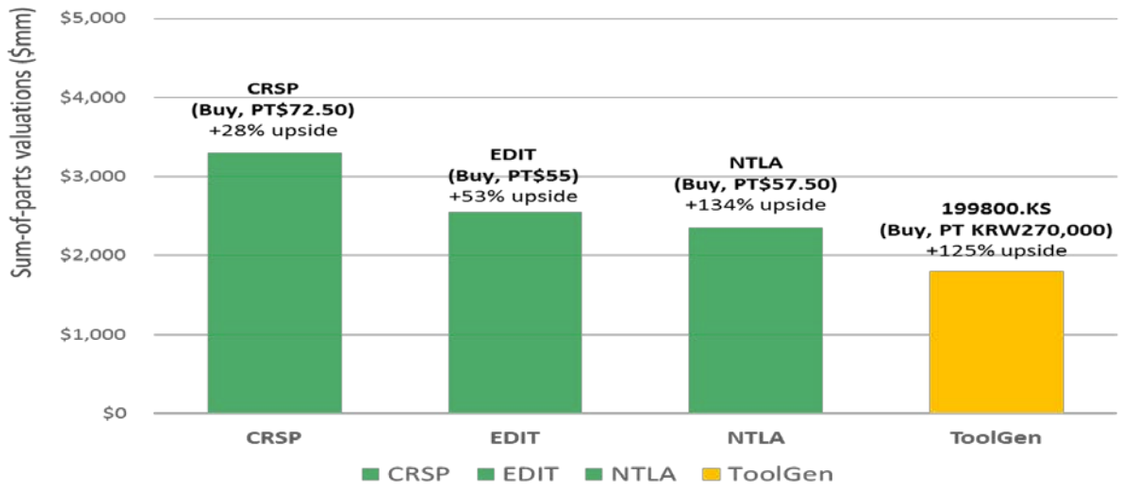
- NASDAQ (CRSP)
- Market Cap: $ 2.55B
- *2 ex vivo* assets (CAR-T and HSC) in clinic

Editas MEDICINE

- NASDAQ (EDIT)
- Market Cap: $ 1.13B
- 1 in vivo asset (AAV, inherited eye disease) in clinic

Intellia THERAPEUTICS

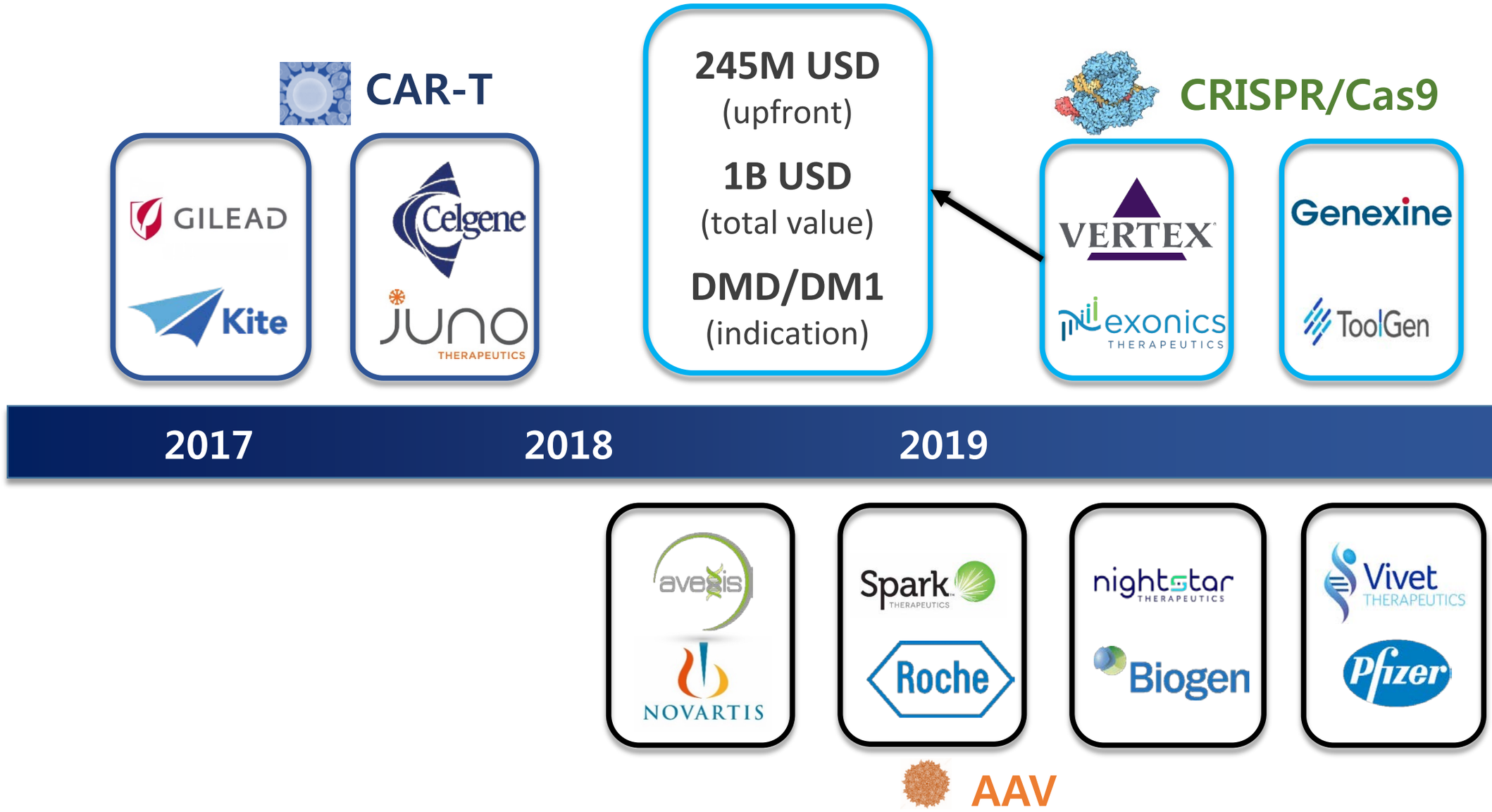
- NASDAQ (INTL)
- Market Cap: $ 687.49M
- Lead program (LNP, ATTR) in preclinical stage



CHARDAN

Rating ToolGen
KRW270,000

Global Trends of M&A in Gene and Cell Therapy

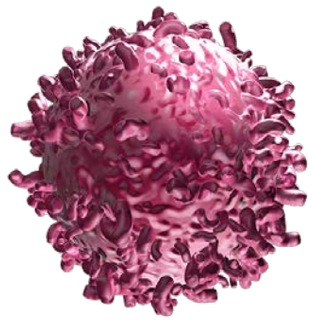


ToolGen: Innovating Genome for Healthier Life

Platform technology

- Foundational IP on **CRISPR/Cas9**
- **Improved** Cas9 for **therapeutic a pplications**
- **Highly specific** guide RNA

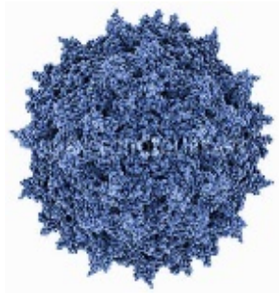
Ex Vivo Programs
Genome-edited therapeutic cells



✓ **Use in CAR-T**
Next-generation Platform

✓ **Use in Stem Cells**
Enhanced therapeutic Effects

In Vivo Programs
CRISPR-based gene therapeutics



Virus

Nanoparticle

✓ **Eye**
wet AMD
Diabetic Retinopathy

✓ **Liver**
Hemophilia

✓ **PNS**
Charcot-Marie-Tooth 1A

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ToolGen Therapeutic Programs (*in vivo*)

Program	Editing Type	Route of Administraion	Major Target population	Target gene
In vivo: Liver				
Liver Biofactory Platform (Hemophilia B)	Insertion (HDR)	Intravenous	Hepatocytes	Hepatocyte safe harbor
Hemophilia A	Inversion (NHEJ)	Intravenous	Liver sinusoidal endothelial cells	*F8*
In vivo: Eye				
Age-related Macular Degeneration	Knockout (NHEJ)	Subretinal/intravitreal	Retinal pigment epithelial cells	*VEGF*
Diabetic Retinopathy	Knockout (NHEJ)	Subretinal/intravitreal	Undisclosed	Undisclosed
In vivo: CNS/PNS				
Charcot-Marie-Tooth Disease	Knockout (NHEJ)	Intrathecal	Schwann cells	*PMP22*
Huntington Disease	Knockout (NHEJ)	Intrathecal/ICV	Striatal neurons	Undisclosed

- Currently applying AAVs for most indications
- Open to expand delivery options
- Open to collaborate on new projects

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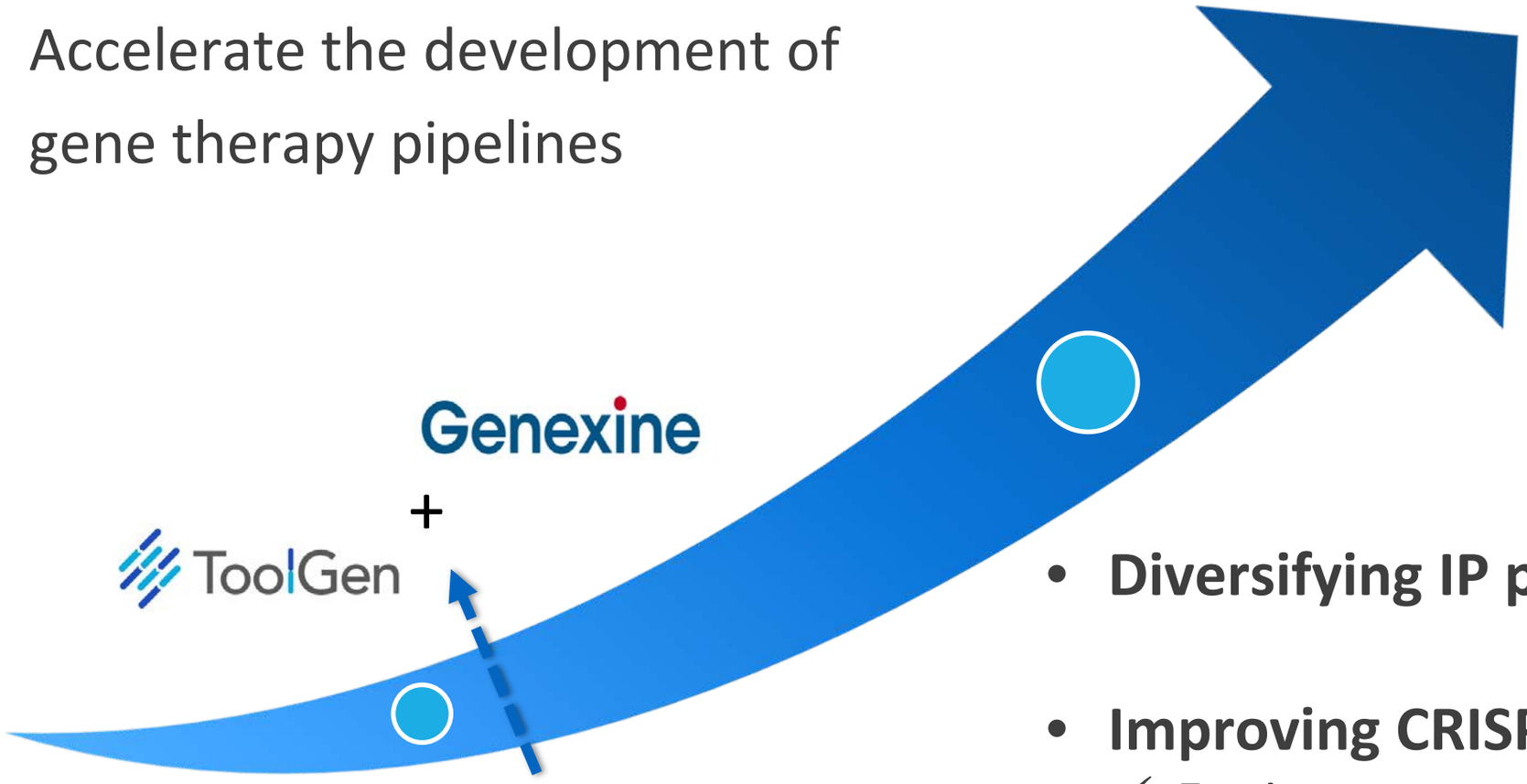
ToolGenexine: Translating CRISPR/Cas9

Asset Value Driver

- ✓ Expand Patent Portfolio
- ✓ Accelerate the development of gene therapy pipelines



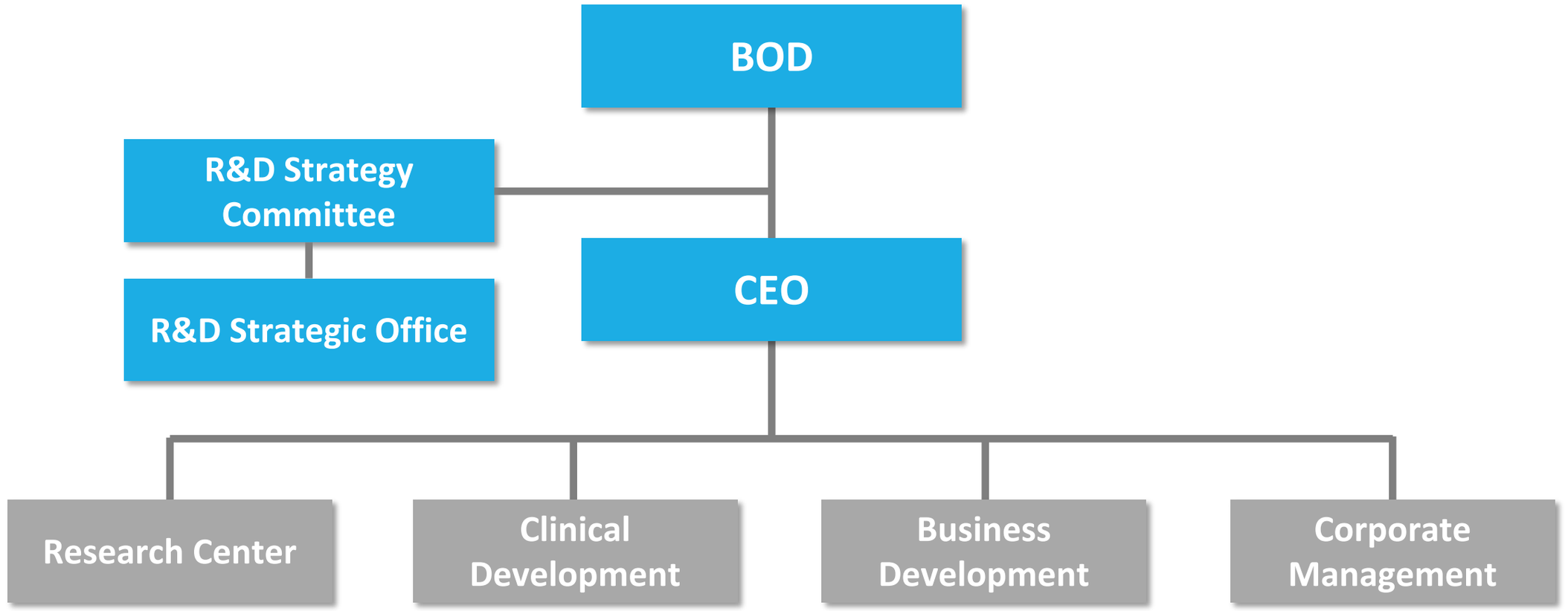
Expanding Territory of
Blocking Claims

- **Diversifying IP portfolio**
- **Improving CRISPR/Cas9**
  - ✓ Ex vivo programs (immune cells)
  - ✓ In vivo programs (genetic/non-genetic)
- **Strategic alliances**
  (M&A, Open innovation)

ToolGenexine Development Strategy

Continuously develop and provide innovative therapeutics using proprietary platform technologies and experiences in drug development from Genexine and ToolGen

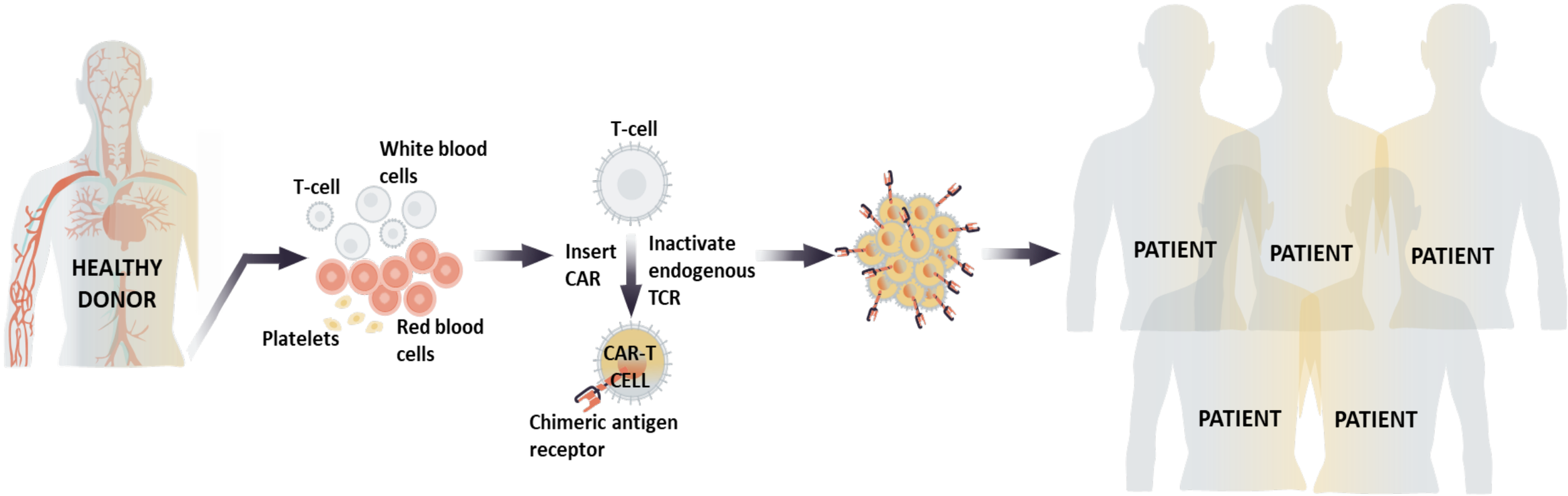
ToolGenexine Organizational Plan



- **R&D Joint Committee**
  - Scientific founders, CTO, CEO and R&D directors
  - Establish R&D strategies and new asset development plans, Strategic alliances (M&A, license-in)
  - First job will be to preparing and executing strategies for **jump-starting next-gen CAR-T programs**.
- **Gradual organizational integration until the opening of new facility in 2021**

Cell Therapy: Personalized to Industrialized

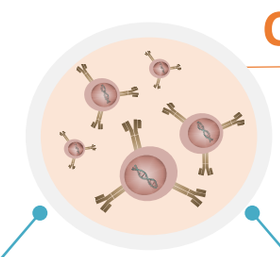
Autologous CAR-T → ***Allogenic*** *CAR-T* → ***Armored*** *Allogenic CAR-T*



Key Features	Cell Therapy 1.0	Cell Therapy 2.0
Cell Source	Patient Cells	Master Cell Line
Manufacturing	Personalized	Off-the-Shelf
Overall Paradigm	Patient-centric	Product-centric

Use of Genome Editing in CAR-T by ToolGen

Next-generation CAR-T

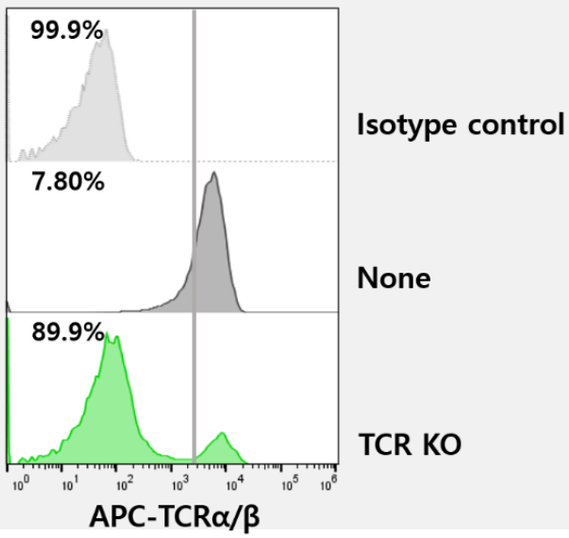


Improved Productivity

Allogeneic Platform

- Production from a healthy donor (lower production cost)
- Off-the-shelf

Removing TCR efficiently from T cell



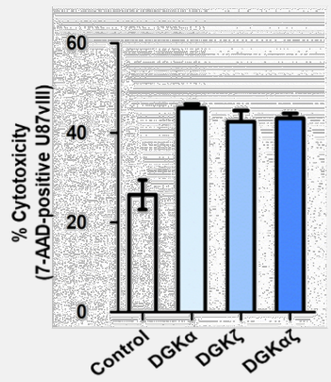
Improved Efficacy

Functional Enhancement

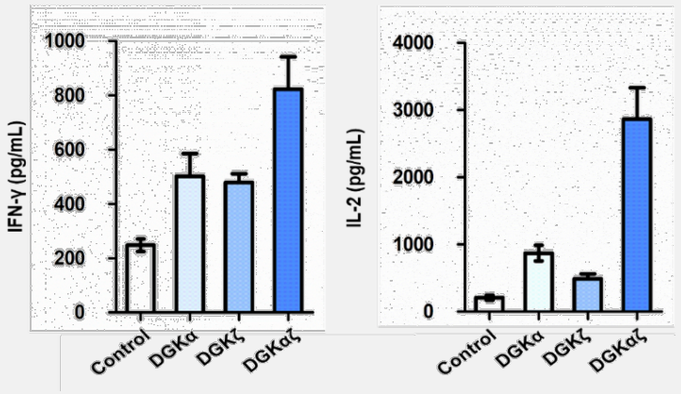
- Higher effector function for better efficacy
- Resistance to negative signals in TME

Invigorated Effector Function by DGK knockout in CAR-T

Cytotoxicity
@Cancer cells



Cytokine Release
@Cancer cells



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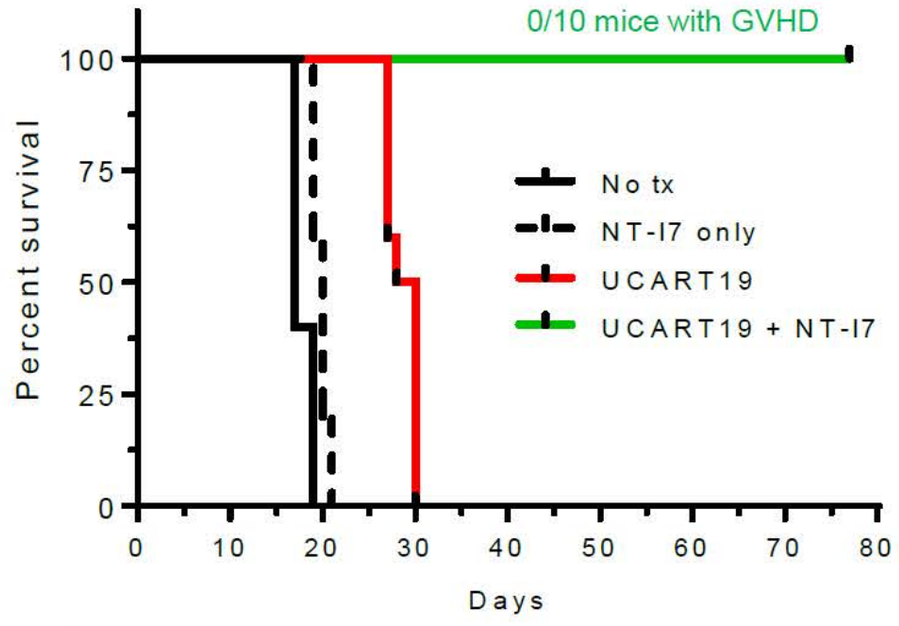
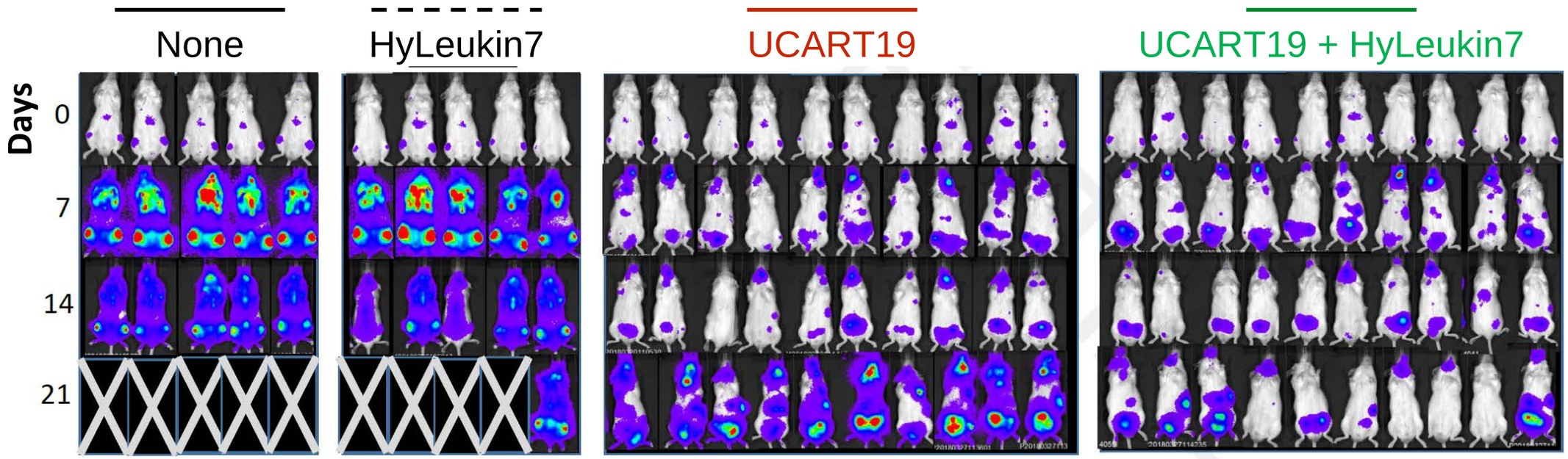
Allogenic CAR-T & Hyleukin-7

- Hyleukin-7 can boost CAR-T persistence in mouse model
- Naïve and Memory T cells are linked with CAR-T persistence/engraftment and clinical outcomes





We are Prepared for the Next Generation CAR-T

Genome Editing

Changing T cell nature

Genome-edited T

+

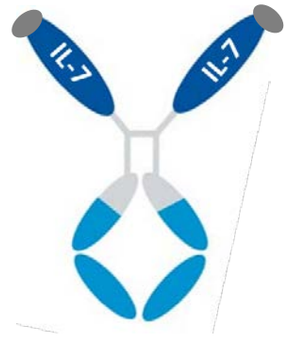
CoImmune (US)

Phase III (dendritic cell/RNA)

CMC/Manufacturing

+

Hyleukin-7



Persistence and Efficacy

Killing Combination

Off-the-Shelf Immune Cell Therapeutics for Solid Cancer

Estimate of Cash Inflow

Genexine ToolGen

Available cash inflow up to yr 2022

KRW 500B + **KRW 30B**

KRW 180B	KRW 135B	KRW 175B	+	KRW 30B
Cash & Cash Equivalent holding	Expected cash flow from long-term Investment	Expected cash flow from L/O		Cash & Cash Equivalent

- Possible to generate sufficient cash internally
- Necessity of a strategic convergence to secure global competitiveness

→ *Genexine ToolGen Merger*

- Sufficient cash for the R&D cost of the merged entity over the next three years
- Capable for active investment and R&D spending for new technologies
- No need of additional funding from FI (avoiding possible dilution of existing share value)
- Available for strategic partnership with SI

Estimate of Cash Outflow

(KRW 1B)

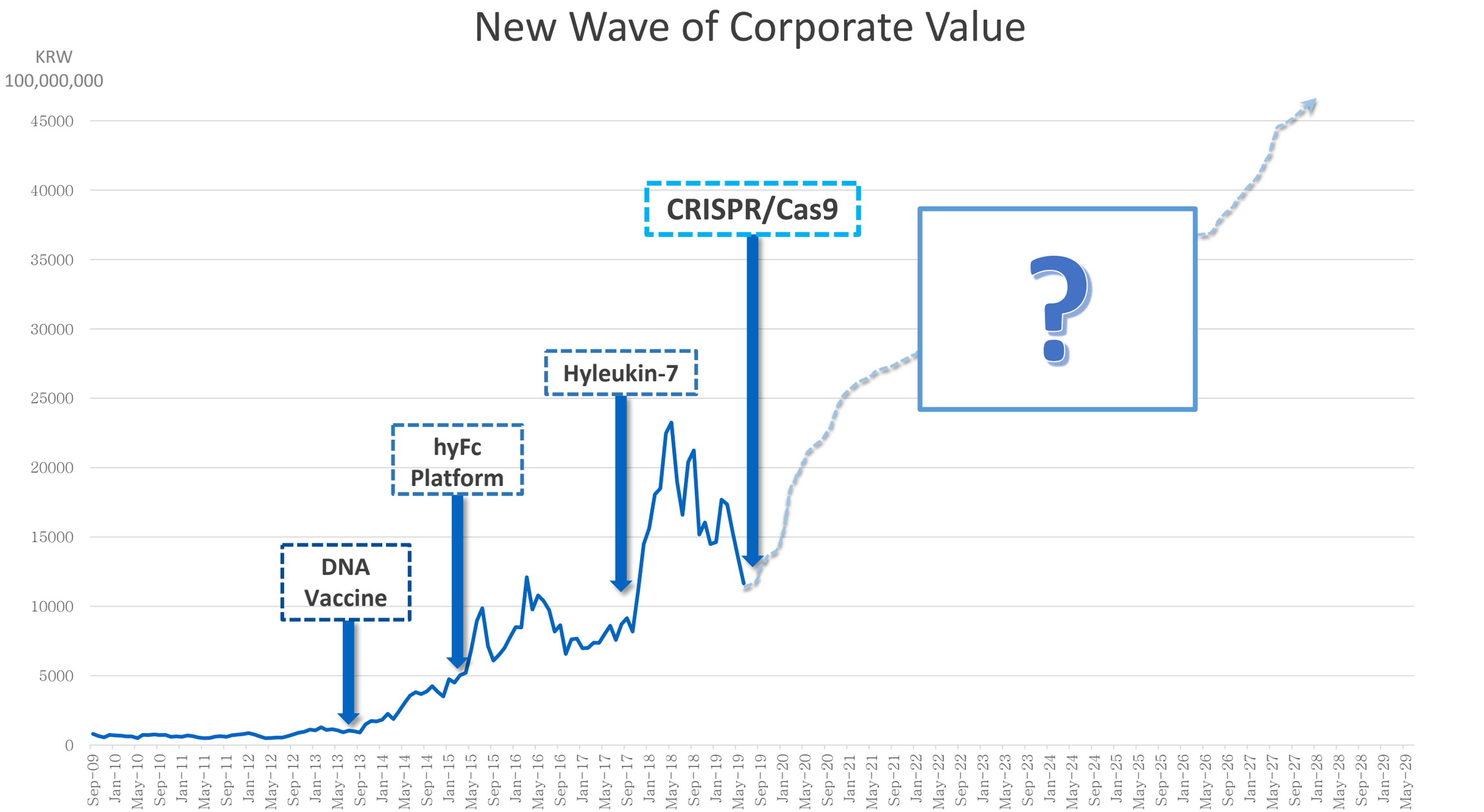
Fund Execution Plan in 2020~2022		
Investment in new technology		**100**
R&D Cost		**153.5**
Cash Outflow	- New Tech (CAR-T, Cell/Gene Therapy)	62
	- First in class drugs (Early Stage)	30
	- First in class drugs (Preclinical)	15
	- Bio-better drugs (Late/Early Stage)	15
	- Research payroll cost	31.5
	Payroll cost	13.5
	General expense (ex. salary)	61
	Establishment of research infrastructure	59
Total Cash Outflow (-)		**387**

- **R&D Strategy Committee : To invest KRW 100~400B for Long-Term Growth**
  - KRW 100B could be allocated from the cash generated internally
  - Further KRW 300B could be available through strategic partnership with SI
  - Responsibilities
    - Next-generation technology development
    - M&A, Strategic equity investment
    - Global License-Out

- **R&D Cost KRW 154B**
  - Priority of next generation pipelines
    - Bi-Specific Anti-body
    - In Vivo Gene Therapy
    - Ex-Vivo (CAR-T, DC Vaccine)

- **Payroll cost/G&A expense KRW 74.5B**
  - Including KRW 35B in IP protection costs of CRISPR/Cas9 (expected to be fluctuated in the future depending on IP interferences, Oppositions)

Market Cap Forecast of ToolGenexine



End of Presentation

Thank you!

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