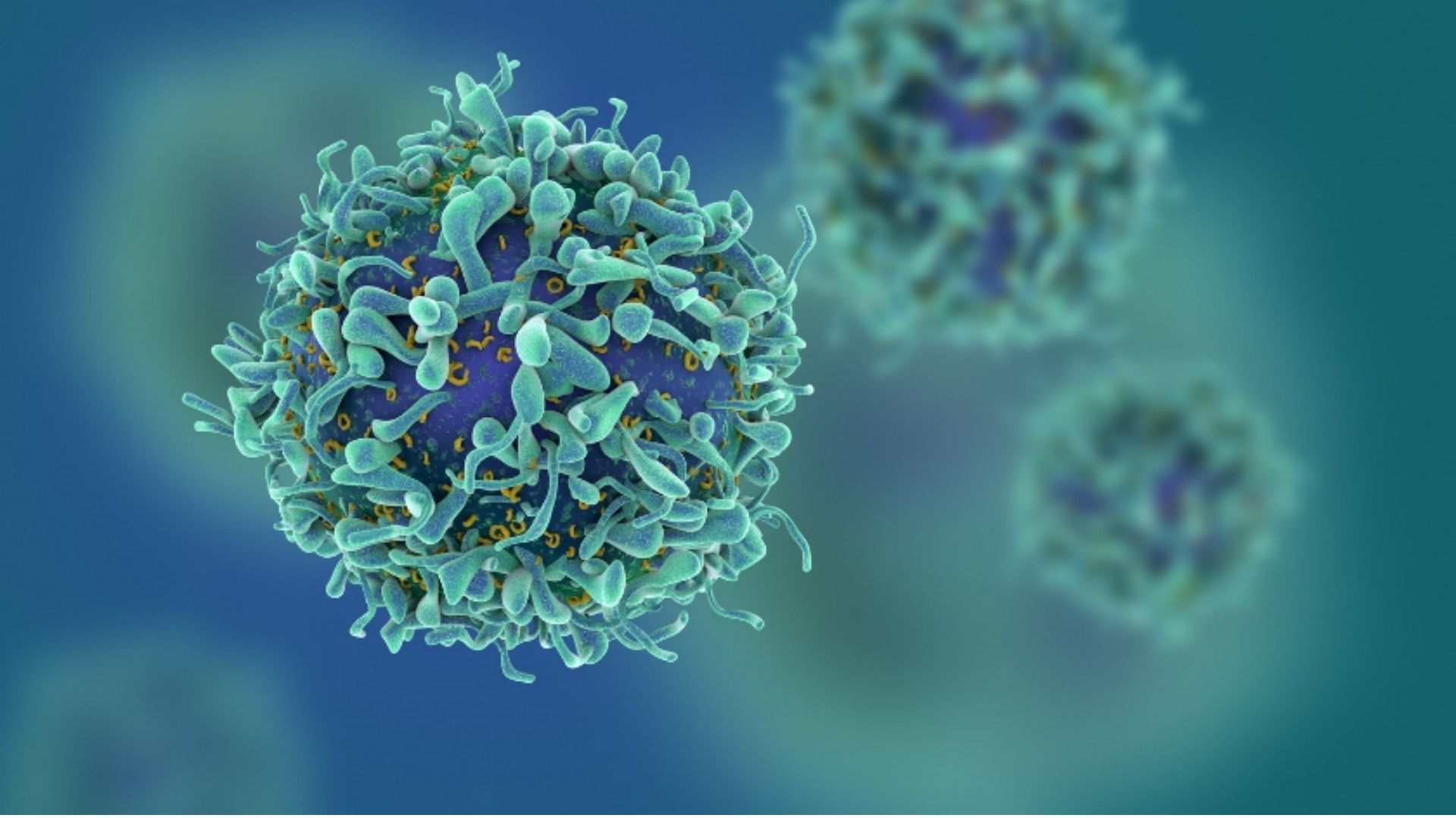


Genexine

Company Overview

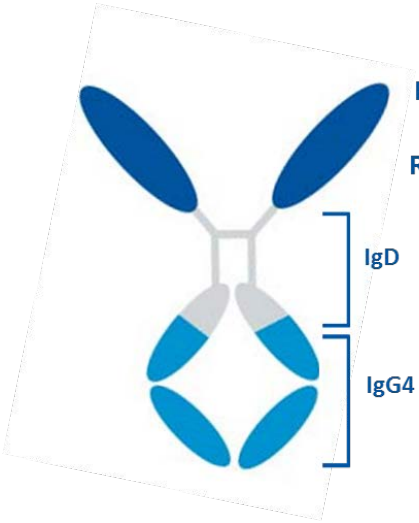
"Focused on the Development of Innovative Immunotherapeutics and Saving the lives of Patients."

Chairman & Founder	• Young Chul Sung, Ph.D.
CEO	• You Suk Suh, Ph.D.
Key Milestones	• Established in June, 1999 • Listed on KOSDAQ since 2009
Platform Technologies	• Hybrid Fc Fusion Technology • DNA Therapeutic Vaccine
Developing Area	• *Immuno-oncology* • *Bio-better* • *DNA therapeutic vaccine*
Employees	• ~165 (MD 2, Ph.D 18, MS 69)
Location	• Korea Bio Park in Techno Valley (Pangyo)

Genexine

Hybrid Fc Technology (hyFc™) evolving to Multi-Target IO

Single Target



Broad applicability

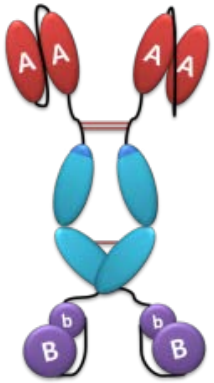
Retained bioactivity
(flexible hinge, less steric hindrance)

No Cytotoxicity
(ADCC or CDC)

Long-acting
(FcRn-medicated recycling)

No mutation

Multi Target



Bi-specific

Tri-specific

hyFc™ is a platform technology to construct a long-acting Fc fusion protein hybridized with IgD and IgG4

Functional Synergy by IO Combination

Combining tumor targeting moiety to cytokine and/or co-stimulatory molecule

Genexine

Genexine's 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	**Papitrol-188** Pre-Cervical Cancer Mono (EU/KR) ***Ongoing***	
		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***	
		Papitrol-188 Pre-Cervical Cancer Mono (KR) ***Completed***		
		Papitrol 188 Cervical Cancer Keytruda Combo (KR) Ongoing 1b/2		

Immuno-Oncology
DNA vaccine
Bio-better drug

Genexine

Global Partnership and Collaboration

Genexine

GX-I7

Interleukin-7-hyFc

Cancer and Lymphopenia

Genexine

GX-I7, Positioning as a “ Key Player of Immuno-Oncology”

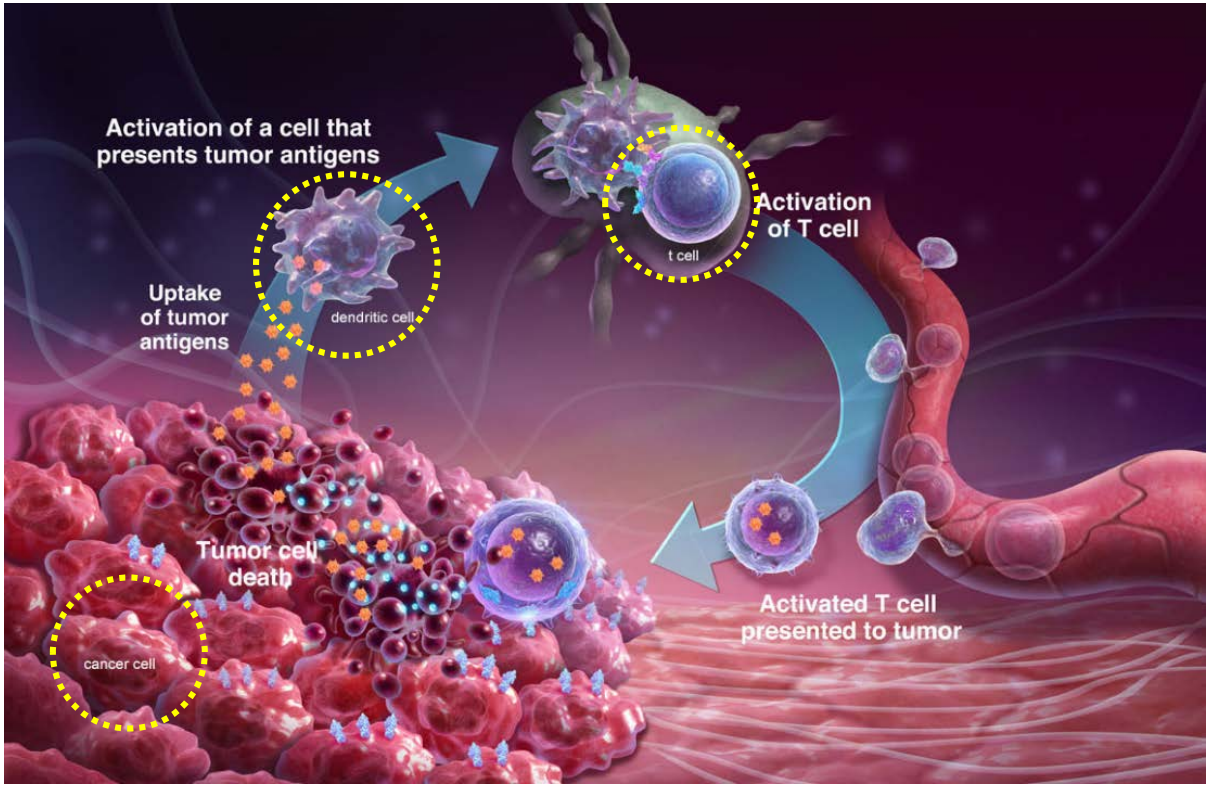
- **Unique homeostatic T-cell growth factor to reconstitute and strengthen anti-tumor T cell immunity**
  - ***Increase number of Naïve T cell and Memory T cell***
  - ***Proliferation of CD4 and CD8***
  - ***Increase Tumor Infiltrating Lymphocytes (TILs)***
  - ***Enhance T cell longevity***

- **The first-in-class drug for Lymphopenia**

- **Genexine and NeoImmuneTech are the only group that pioneers commercialization of long-acting IL-7 as an IO drug**

T cell in Cancer Immunology

How the immune response is generated against the tumor



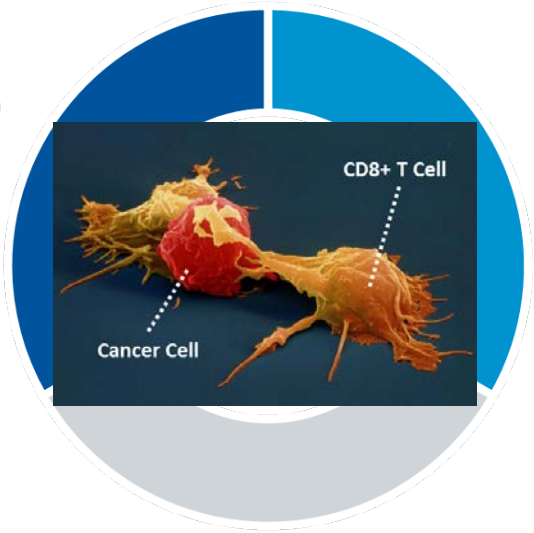
Source: Aduro Biotech image

T cells are the key to destroying cancer

T cell at the Center of Immuno-Oncology

T cell Amplifier

- **IL-7 (Genexine/NeoImmuneTech)**



T cell Activator

- CAR-T (Kite, Juno, Bluebird, etc.)
- Oncolytic virus (Amgen, Sillajen, etc.)
- Cancer vaccine (Genentech, etc.)
- IL-15 (Novartis, Altor, etc.),
- IL-2 (Nektar), IL-21, etc.
- CD137, OX40

T cell Suppressor Inhibitor

- Anti-PD1 (Merck, BMS, etc.)
- Anti-PD-L1 (Genentech, etc.)
- Anti-CTLA4 (BMS, etc.)
- Anti-TIM-3, anti-LAG-3, etc.
- IDO inhibitor, TIGIT, etc.

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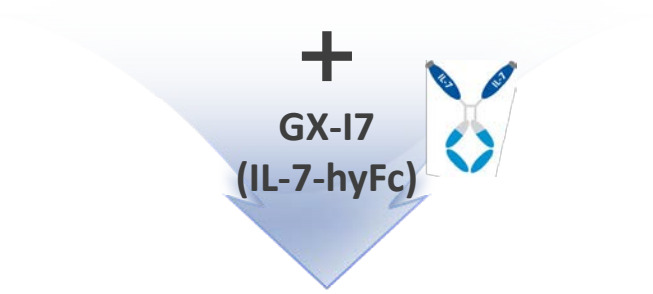
Unmet Needs of Current Cancer Immunotherapies

Anti-PD-1/PD-L1
FDA approved Indications and ORR in patients with

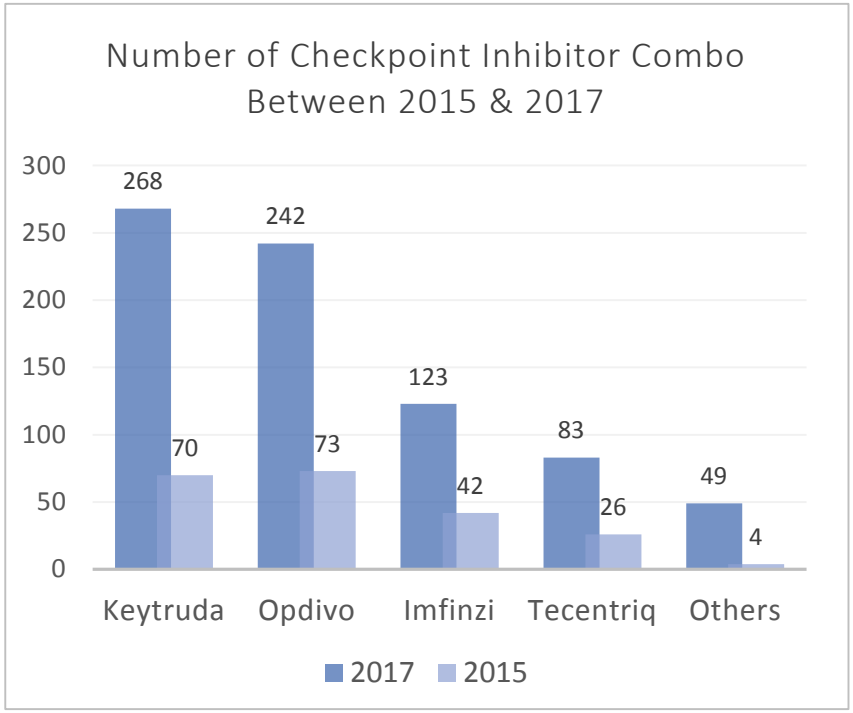
Melanoma	17~50%
Lung cancer	10~30%
Kidney cancer	12~29%
Bladder cancer	15~30%
Head and neck cancer	20~25%
Hodgkin lymphoma	65~87%
Merkel cell cancer	32~64%
MSI-High solid tumors	~50%
Hepatocellular cancer	~15%
Gastric cancer	~15%

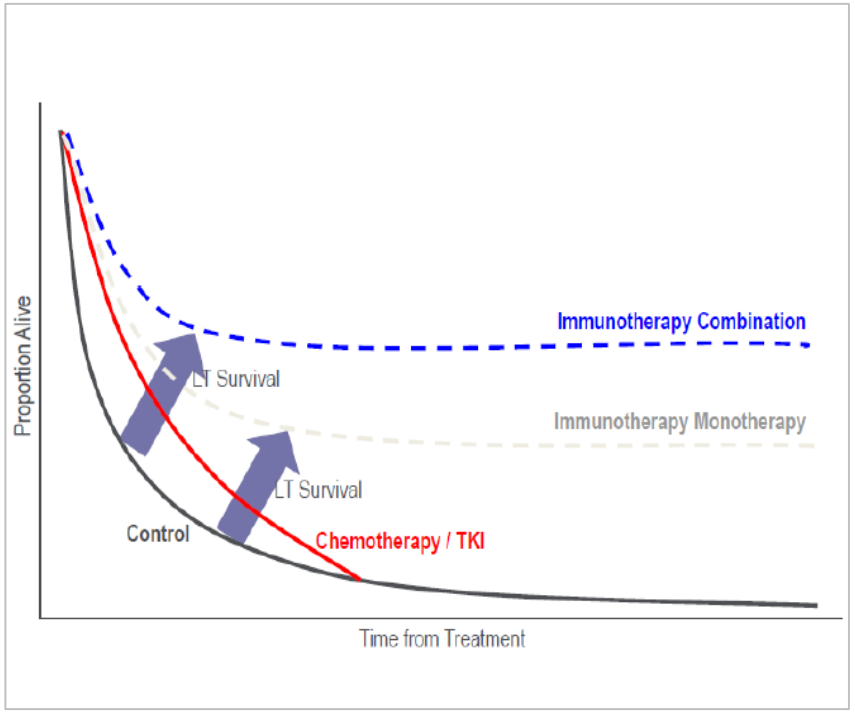
Low T-cell numbers in
Non-responders



Improving Response Rate and Survival
By Boosting T-cell levels

Wave of Checkpoint Inhibitor Combo Trials



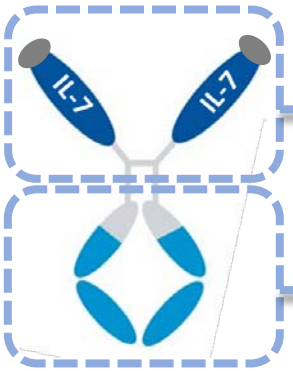


Source: Evaluate Ltd. May 2017

Combination involving checkpoint inhibitor therapies are starting to be used as the standard of care in certain cancer types

GX-I7 : Optimized Long-Acting IL-7

GX-I7 (IL-7-hyFc)

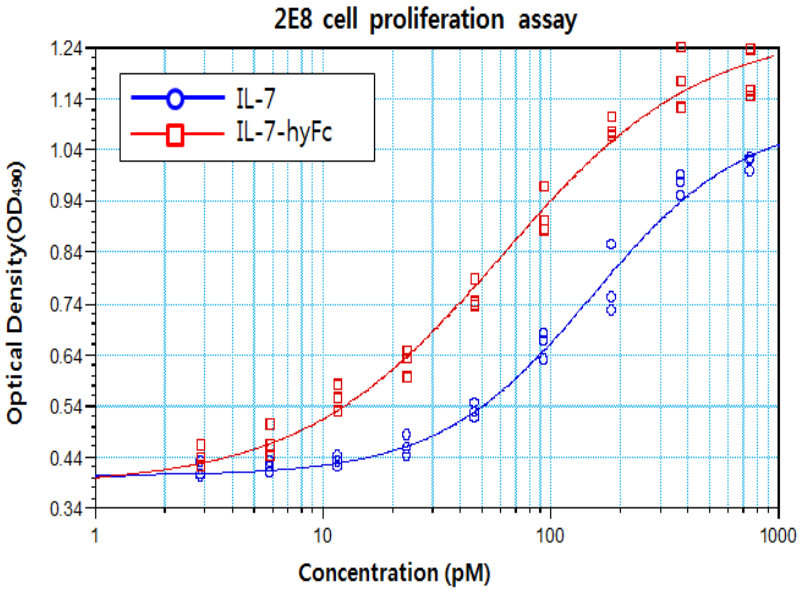


Engineered Attaching N-term amino acid to IL-7 for higher stability and productivity

Safe No cytotoxic effect on target cells

Long-Acting half-life extension up to 100 hours

Improved *in vitro* bioactivity vs. IL-7



Protein	ECsd(pM)
IL-7	204
IL-7-hyFc	69

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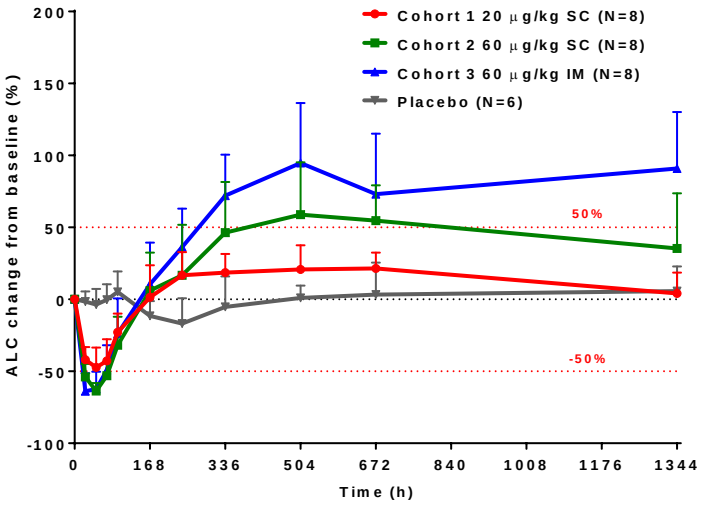
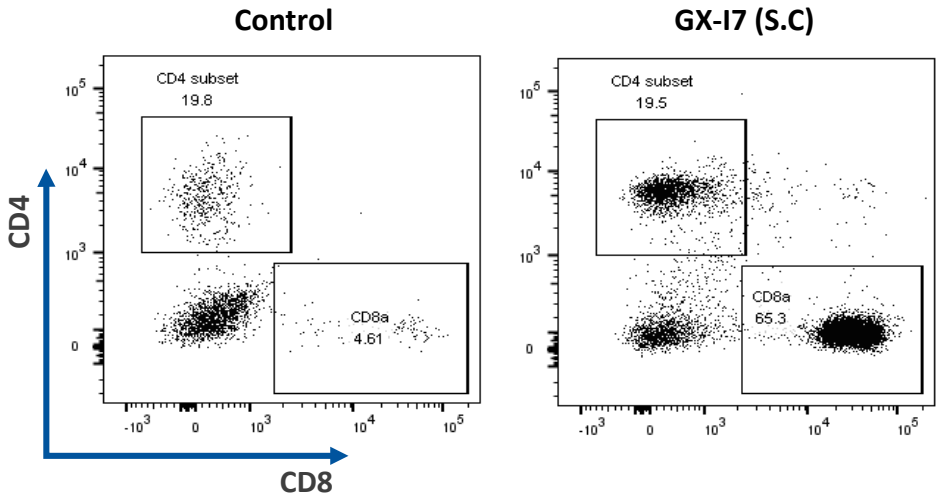
IL-7 Proof of Concept In-vivo and Human

In Healthy Volunteers



In syngenic tumor model



Undisclosed data from Genexine

- ✓ GX-I7 was well tolerated and safe, and no SAE was observed in the study. The most common AE was G1~2 injection site reaction (83.3%) and resolved over 1~2 weeks.
- ✓ A single dose of IL-7-hyFc substantially increased the absolute lymphocyte counts(ALC) and the number of CD4/CD8 naïve and memory T cells without an increase in the number of regulatory T cells.

Source: AACR 2019

Increase of TIL*

- ✓ ***Mild increase of CD4***
- ✓ ***Dramatic increase of CD8***

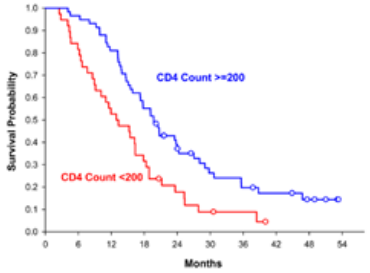
*TIL: Tumor infiltrating lymphocytes

Genexine

The Higher T cell # in Blood, The Better Overall Survival

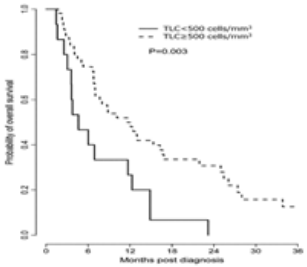
T cell number as a prognostic marker of overall survival in most cancer patients treated with chemotherapy or/and radiotherapy

High Grade Glioma	
mOS	13.1m vs 19.7m



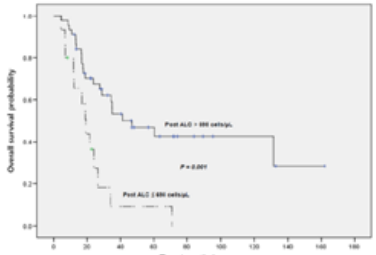
[Gupta T. et al. Clin Neurol Neurosurg 2013;115(9):1814-9]

GBM, New/Elderly	
mOS	4.6m vs 11.6m



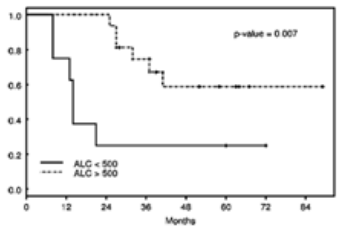
[Mendez J. et. Al. J Neurooncol. 2016 Apr;127(2):329-335.]

SCLC, Limited	
mOS	12.2m vs 35.3m



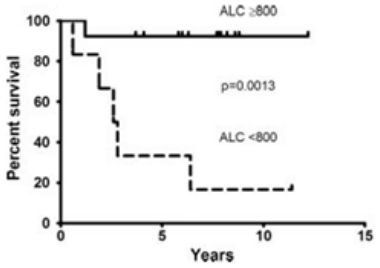
Cho O et al., [Tumour Biol. 2016 Jan;37(1):971-8]

Ewing Sarcoma	
5y OS	25% vs 58.7%



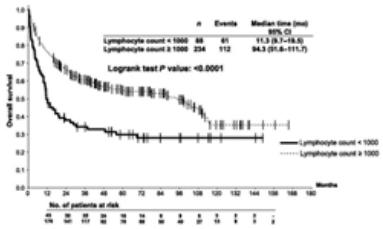
[De Angulo G. et al., J Pediatr Hematol Oncol. 2007]

Pediatric Osteosarcoma	
5y OS	33.3% vs 92.3%



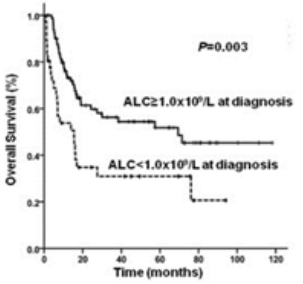
[Moore C. et al., Pediatr Blood Cancer. 2010]

Non-Hodgkin's Lymphoma	
mOS	11.3m vs 94.3m



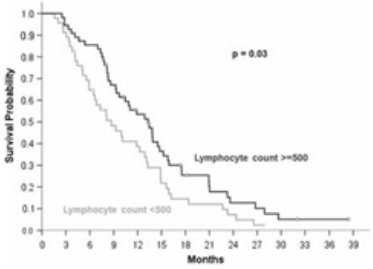
[Ray-Coquard et. al. Cancer Res 2009;69(13): 5383-5391]

Peripheral T cell Lymphoma	
mOS	15.5m vs 69.4m



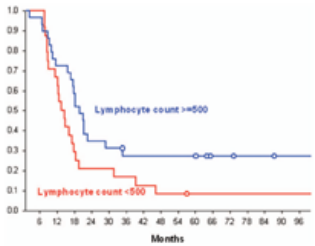
[Kim YR et. al. J Hematol Oncol. 2011; 4: 34].

Pancreatic, Stage III/IV	
mOS	8.7m vs 13.3m



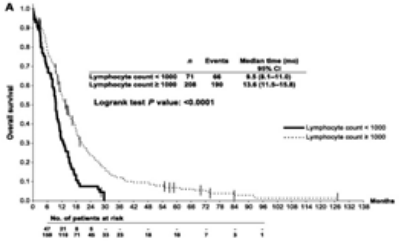
[Wild et. al. Am J Clin Oncol 2015 June;38(3):259–265.]

Pancreatic, New/Resected	
mOS	14m vs 20m



[Balmabnoukian et. al. Cancer Invest.2012October;30(8):571–576.]

metastatic Breast Cancer	
mOS	10m vs 14m



[Ray-Coquard et. al. Cancer Res 2009;69(13): 5383-5391]

Genexine

GX-I7 Potential Clinical Applications

Combotherapy

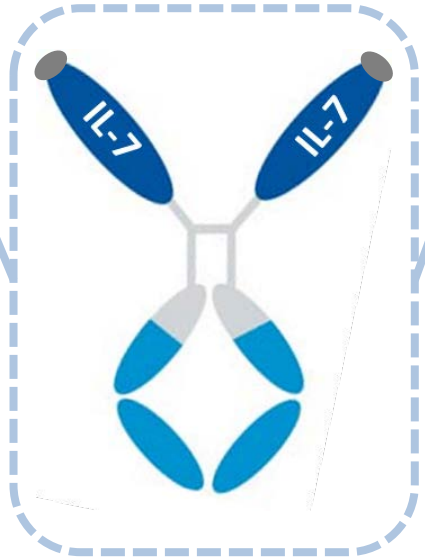
Cancer

Chemotherapy & Chemo/Radiotherapy

Checkpoint Inhibitor
Anti-PD-1, Anti-PD-L1
Anti-TIM3, Anti-LAG3…

Cell Therapy
CAR-T
TCR-T

Cancer Vaccines
DNA, RNA
Peptide, Viral



Monotherapy

Lymphopenia

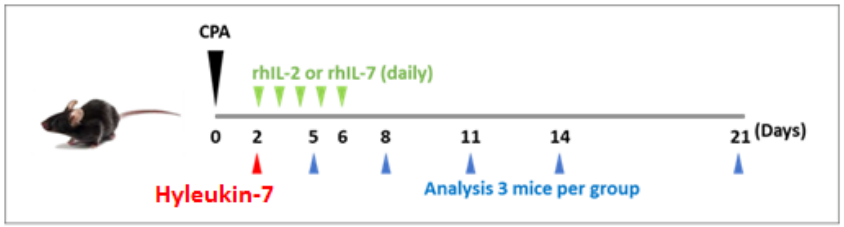
Cancer-induced lymphopenia

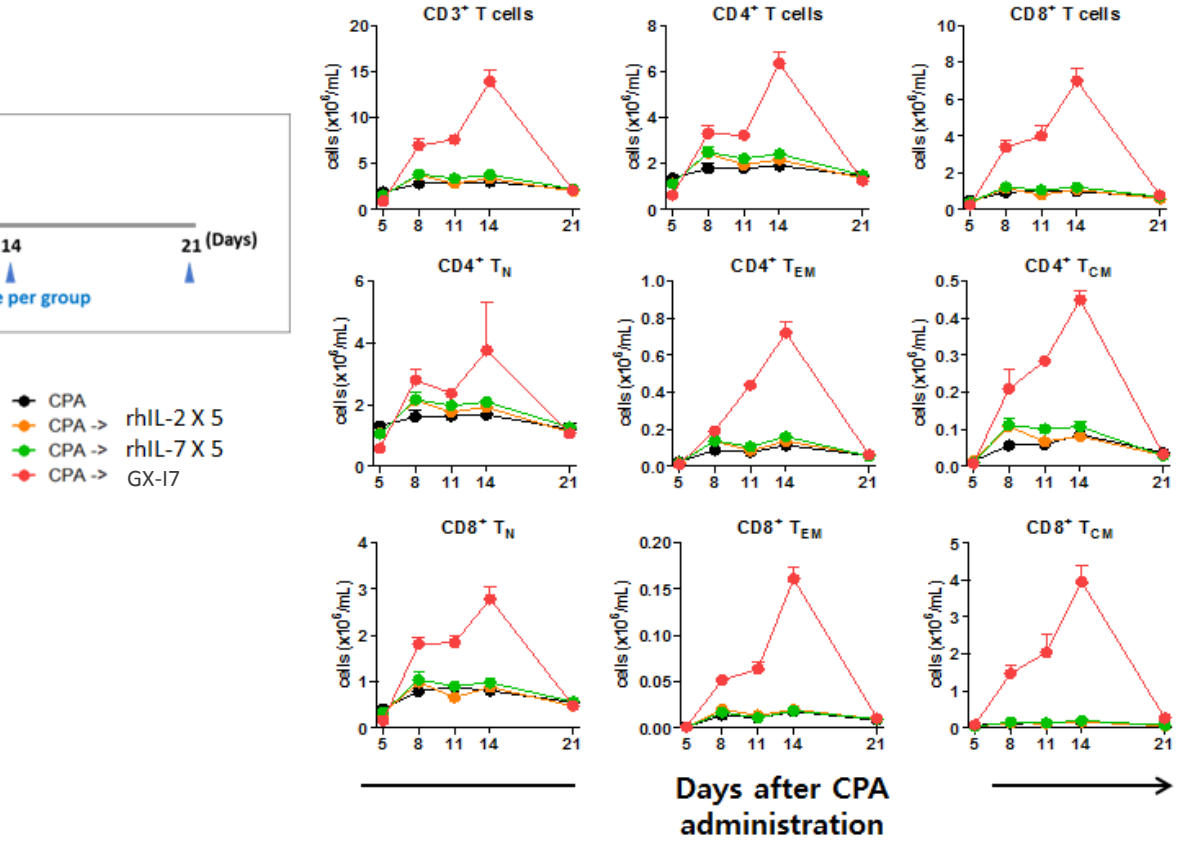
- ✓ Lymphopenia associated with chemotherapy was found in 15% patients approximately
- ✓ So far, no available treatment for lymphopenia patients

Key Player for Cancer Immunotherapy

Genexine

Robust Increase of Absolute Lymphocyte Count by Combination of GX-I7 and CPA*



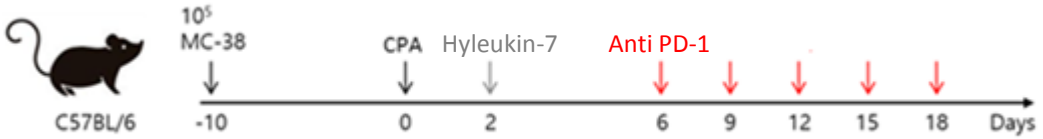


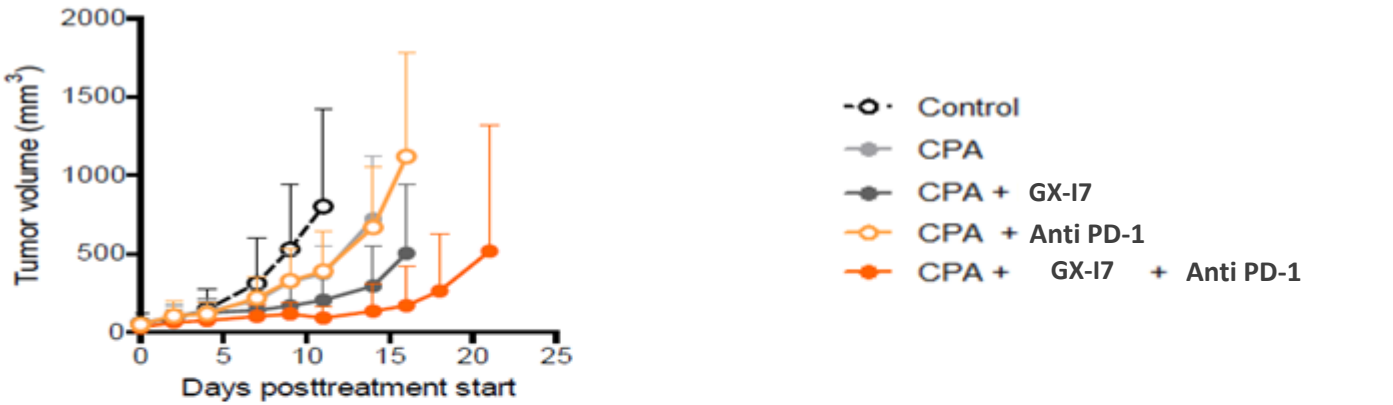
AACR2018, POSTECH SW Lee et al

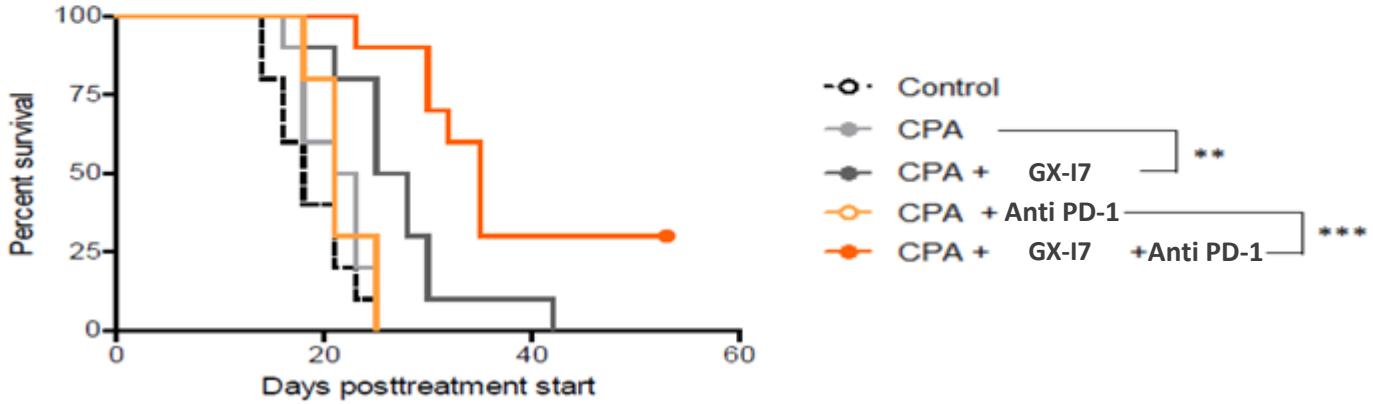
*Cyclophosphamide is a medication used as chemotherapy and to suppress the immune system.

Genexine

GX-I7 Enhances Anti-Tumor Effect of Anti PD-1



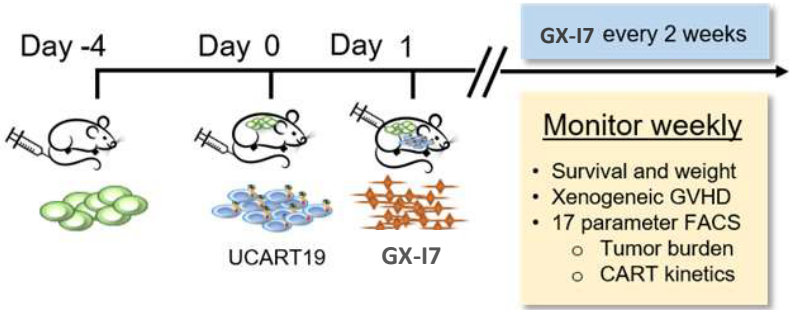


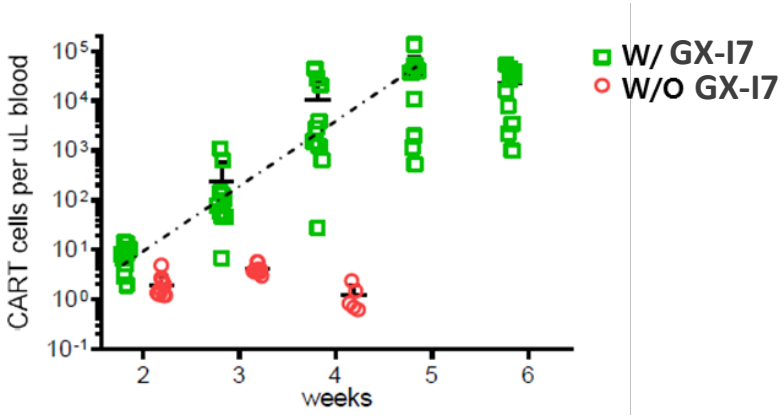


[Lee SW et. al. Unpublished data]

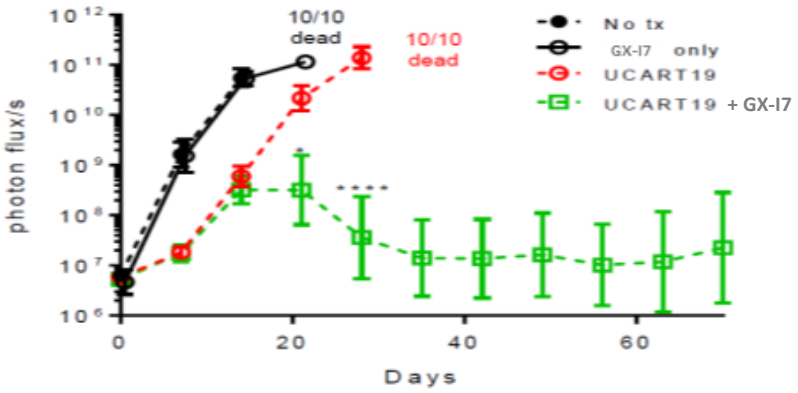
GX-I7 Combined Therapy with CAR-T

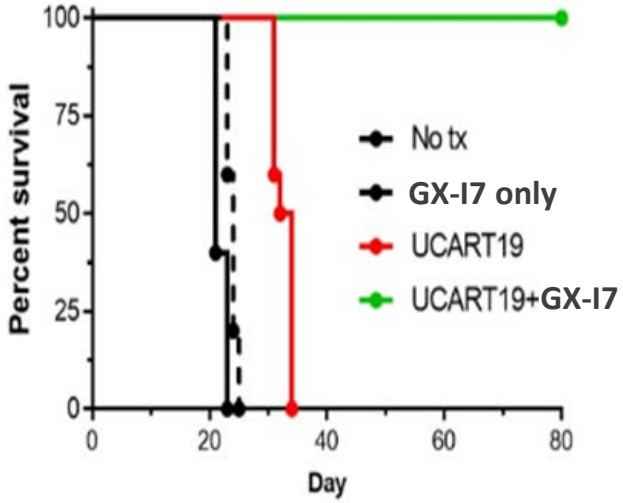
GX-I7 enhances CAR-T expansion and persistence





GX-I7 enhances CAR-T efficacy





DiPersio J. et . al. ASH 2018

Clinical Development Status

2019	2020	2021
✓ *Effective dose/ regimen* ✓ *TIL*	✓ *Interim data of clinical benefit*	✓ *Clinical benefit*

GX-I7		Phase 1a	Phase 1b	Phase 2a	Phase 2b		Site	Note
Healthy Volunteers		→	→			Ph1 Completed	**KR**	
Solid Tumor	Mono	→	→				**KR**	
	CPA Pre-Conditioning	→	→			Ph 1b/2a	**KR**	
Glioblastoma	Mono	→	→			Ph 1b/2a	**KR/US**	**NCI /CITN**
	TMZ Combo*	→	→			Ph 1b/2a	**US**	
Skin Cancer (Melanoma, MCC, cSCC,)	Tecentriq Combo*	→	→			Ph 1b/2a	**US**	**ION**
Triple Negative Breast Cancer	Keytruda Combo*	→	→			Ph 1b/2	**KR**	**KDDF**

NCI: National Cancer Institutie, CITN: Cancer Immunotherapy Trials Network, ION: Immuno Oncology Network, KDDF: Korea Drug Development Fund
* The sponsor of Glioblastoma and skin cancer is NeoImmuneTech, affiliate company.
* Triple Negative Breast cancer was supported by KDDF and co-developed by Merck and NeoImmuneTech

GX-H9

Long-acting Human Growth Hormone

Human Growth Hormone Deficiency

Genexine

Unmet Medical Needs

Daily Treatment

➢ **365** Injections/year

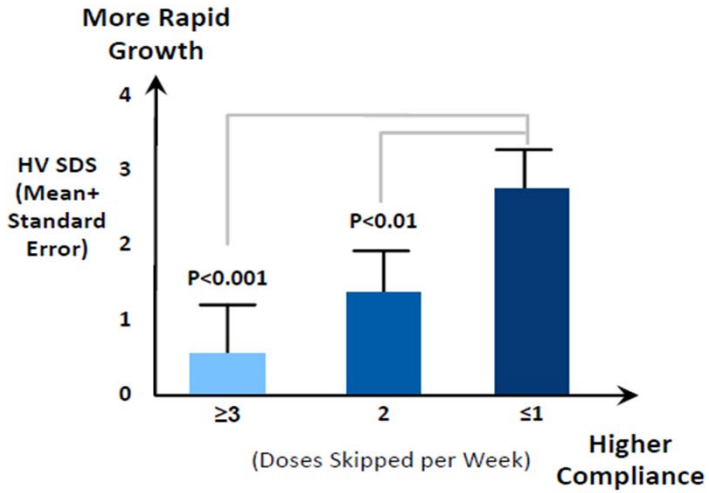
vs

Weekly/Twice Monthly

➢ **52/26** Injections/year

Daily
- Painful
- Poor compliance
- Under-treated

Weekly/ Twice-Monthly
- Improved Quality of Life
- Good compliance
- Full growth potential



Age Range of Target Population:
5 -12 yrs old

Average Treatment Period:
2-7 years

PLoS ONE Jan. 2011 Vol 6 Issue 1 e16223

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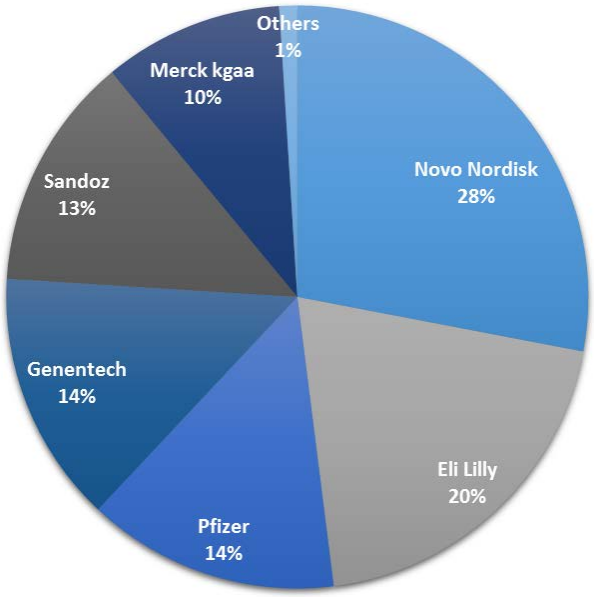
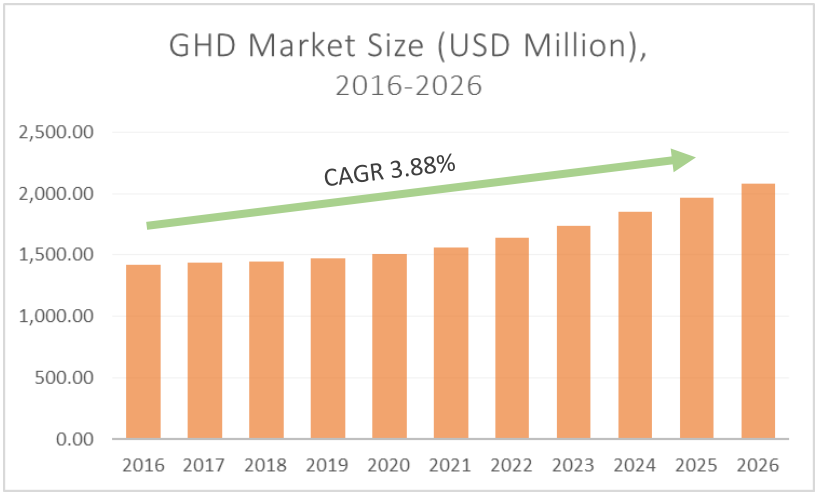
Growth Hormone Therapeutic Market

*Market Size of GH was **USD 1.4 billion** in 2018*





Source: GlobalData

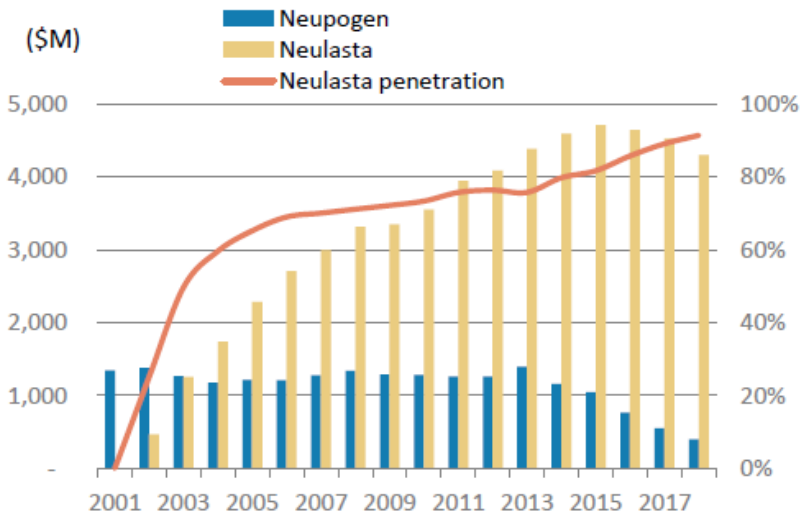
- Six market players take up 99% of the overall market
- Only *Novo Nordisk* and *Pfizer* are developing long-acting growth hormone

- Market size is expected to increase with ;
  - ✓ Income increase in emerging countries
  - ✓ Launching of long-acting theraphies
  - ✓ Off label market has great potential

Genexine

Market Penetration of Long-acting Drugs

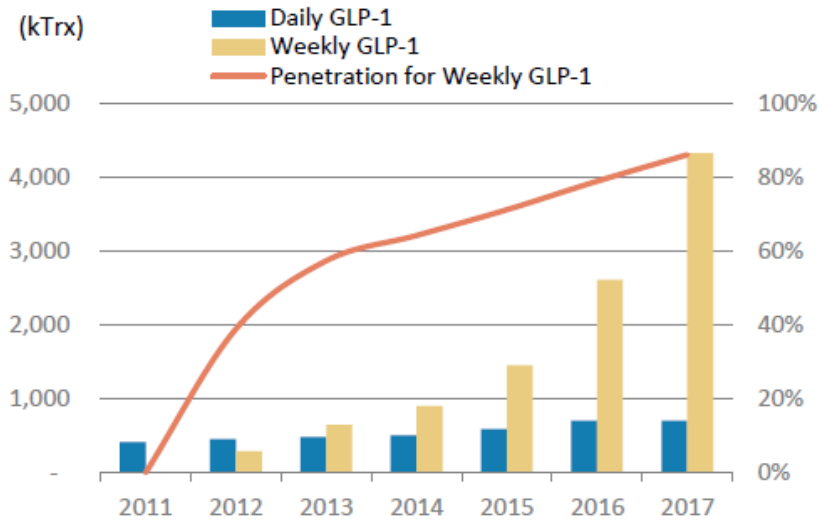
Weekly G-CSF Neulasta Penetration after Launching



Source: Bloomberg, Morgan Stanley

- ✓ Long acting G-CSF launched in 2002
- ✓ After launching, penetration 25% in 2002
- ✓ In 2018, penetration went up to 95%

Weekly GLP-1 (Bydureon, Trulicity) Penetration after Launching



- ✓ Long acting GLP-1 launched in 2012
- ✓ In 2017, 86% penetration

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Failed Attempts of LA-hGH Development

Reasons for failure: CMC, efficacy, and safety issue

Company	Genentech	Pfizer	Novo Nordisk	Merck-Serono	TEVA	Versartis
Product	Nutropin	Genotropin	Norditropin	Saizen (Merck-Serono)	Tev-tropin	VRS-317
Long-Acting Technology	PLGA	Pegylation	Pegylation	Targeted Pegylation	Albumin fusion	XTEN
Dose	monthly	weekly	weekly	weekly	weekly	twice-monthly
Reason	**Manufacturing issue & Pain (2004)**	**Safety issue in Phase 2 (2007)**	**Poor efficacy in Phase 2 (2010)**	**Safety issue in Phase 2 (2011)**	**Safety issue in Phase 1 (2016)**	**Poor efficacy in Phase 3 (2017)**

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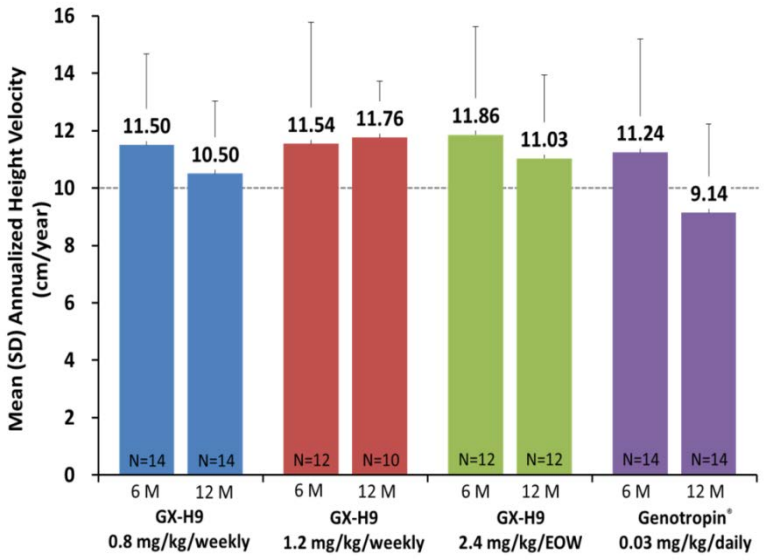
GX-H9 : 12-month Height Velocity Data

Mean (SD) Annualized Height Velocity
at 6 months and 12 months after Treatment



Source: ESPE 2018 Poster presentation
*EOW: Every other week

- The height velocity at 12 months indicated com -parable growth rates between all doses of GX-H9 (both weekly and EOW* schedules) and the active comparator, Genotropin®.
- GX-H9 treatment for 12 months was safe and well-tolerated as Genotropin® for GH-naïve pat -ients with PGHD.
- GX-H9 showed potential for both weekly and twice-monthly administration in children with GHD.

Long-acting Growth Hormone Programs

Company		Genexine	ascendis pharma	OPKO Pfizer	novo nordisk
Drug		GX-H9	ACP-0001	MOD-4023	NNC0195-0092
Long-acting Technology		hyFc	TransCon PEG	CTP	Albumin
Frequency		Weekly Twice-monthly	Weekly	Weekly	Weekly
Stage of Development	**Adult**	Phase 2 completed	Phase 2 completed	Phase 3 failed	Phase 3 On-going
	Pediatric	Phase 2 completed Preparing for Phase 3 IND	Phase 3 On-going	Phase 3 On-going	Phased 2 completed Preparing for Phase 3 IND
Height Velocity		**Ph2 12 month** 0.8mg 10.5cm/yr 1.2mg 11.76cm/yr 2.4mg 11.03cm/yr (EOW) Geno 0.03mg 9.14cm/yr	**Ph3 12 month** 0.24mg 11.2cm/yr Geno 34 µg 10.3cm/yr	**Ph2 12 month** 0.25mg 10.44cm/yr 0.48mg 10.96cm/yr 0.66mg 11.93cm/yr Geno 0.034mg 12.46cm/yr	**Ph2 6 month** 0.04mg 8.0cm/yr 0.08mg 10.9cm/yr 0.16mg 12.9cm/yr Nord 0.034mg 11.4cm/yr
CMC		Genetic fusion	Chemical conjugation	Genetic fusion	Chemical conjugation

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Papitrol-188

HPV Therapeutic DNA Vaccine

Human Papilloma Virus (HPV) Induced Pre-Cancers & Cancers

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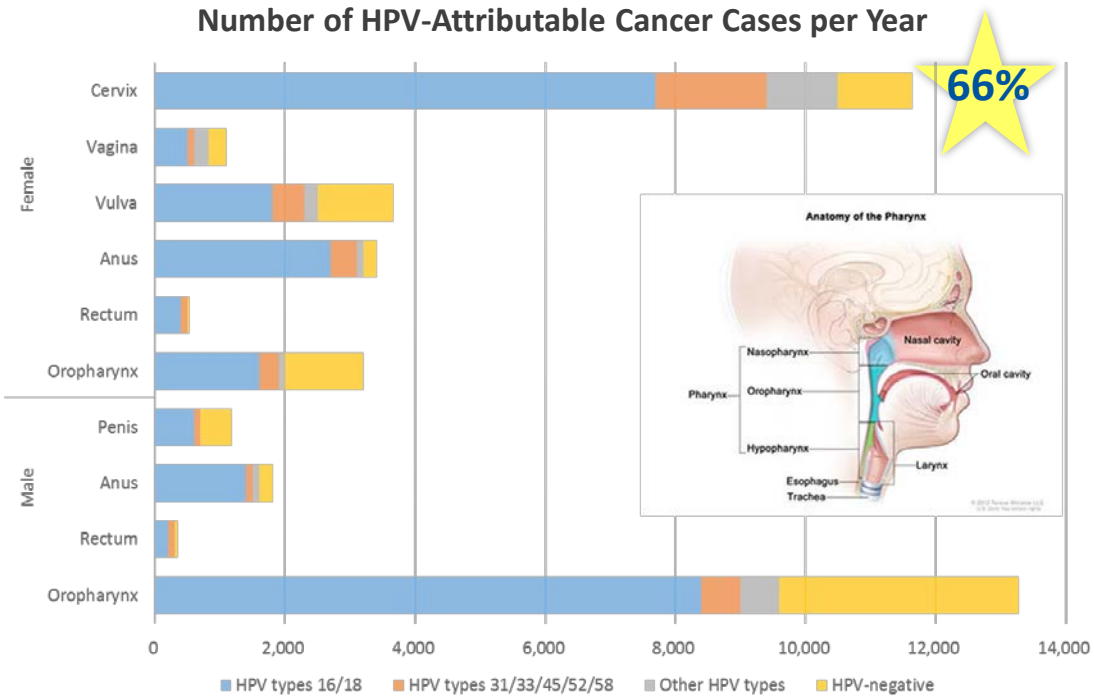
HPV induced Cancers



Source: Centers for Disease Control and Prevention (CDC), Number of HPV-Associated and HPV-Attributable Cancer Cases per Year, 2015

- About **270,000** women die from cervical cancer every year
- About 500,000 cervical cancer and other HPV-induced cancer patients builds up about **$2~3 Billion market**
- **HPV 16/18 type causes**
  - **66%** of cervical cancer
  - **63%** of head and neck cancer

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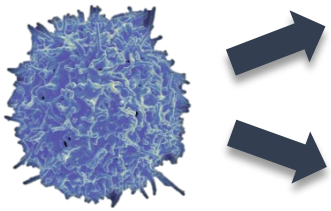
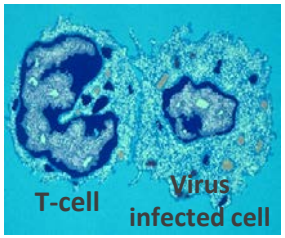
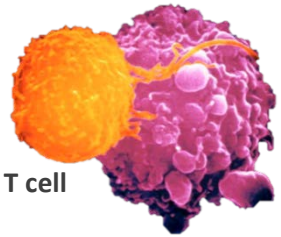
HPV DNA Vaccine Technology

T-cell is the key player for curing cancers



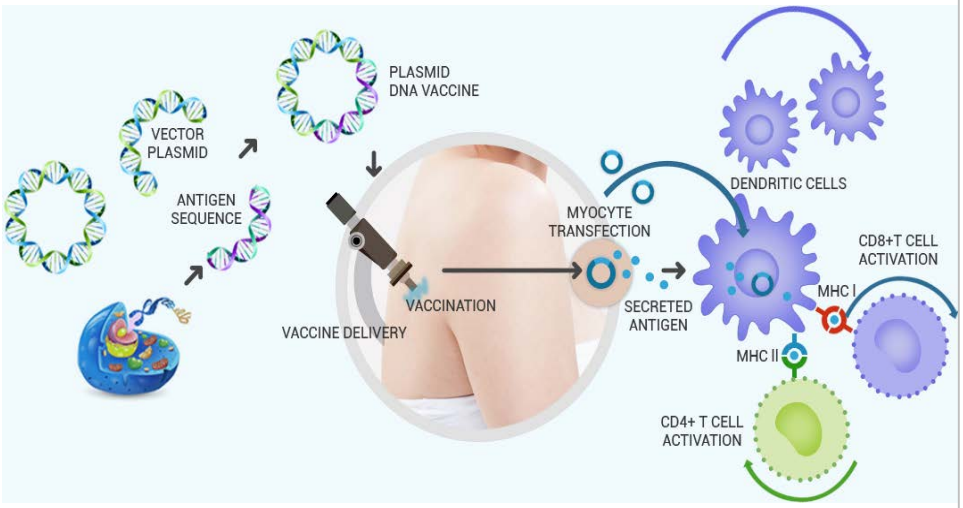


Killing effect



Healthy Human T-cell
: Lymphocyte that play a central role in cell-mediated immunity

DNA-based Immunotherapy



DNA-Based Immunotherapy

- HPV 16/18-specific antigen encoded plasmid
- DNA vaccine delivery to cells by intramuscular injection
- HPV-specific antigen activates HPV specific T cells
- Killer CD8+ T cells eliminates HPV-infected cells

Source: Britannica.com, scitechdaily.com

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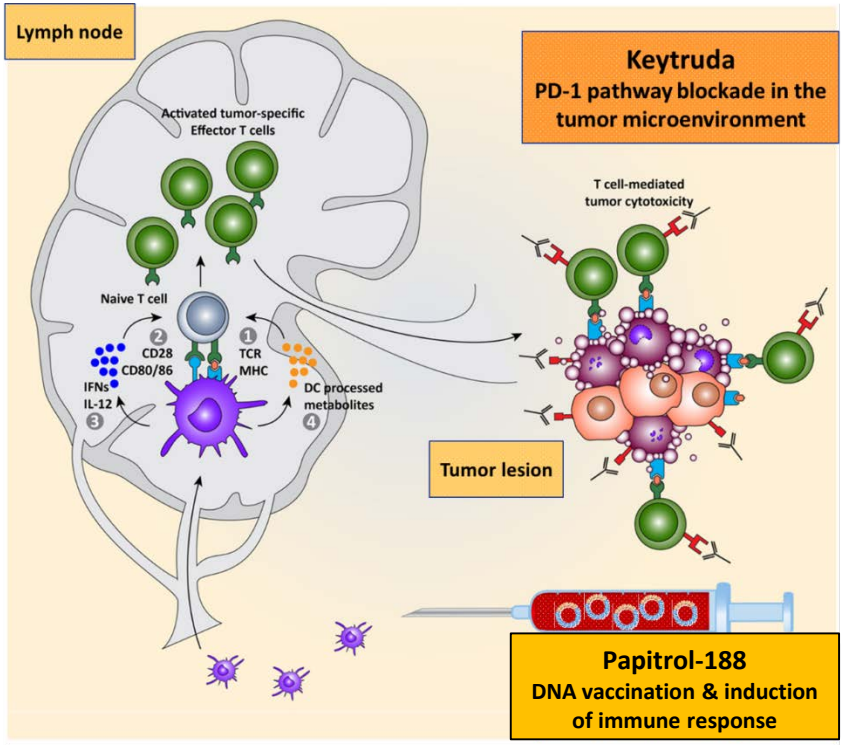
Combination with Keytruda for Cervical Cancer

Blockade of the PD-1/PD-L1 pathway would be strong means to enhance the efficacy of Papitrol-188 vaccination



"Synergistic effect for cancer therapy"

Papitrol-188 & Keytruda® Collaboration Overview

- Phase 1b/2 clinical trial in Korea
- Initiated in May 2018
- Purpose: To investigate an increased response rate of tumor-specific T cell as well as safety and efficacy of combination therapy

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Portfolio of HPV DNA Vaccine Pipelines

Program	MOA	Indication	Clinical stage	Remark
Papitrol 188	Induction of HPV16/18 (E6/E7)-specific immune responses	CIN 2/3	Ph2b	
		Metastatic Cervical Cancer	Ph1b/2	*Combination with Keytruda*

* CIN: Cervical intraepithelial neoplasia

- Next Pipeline 1 : Target indication CIN1 (2,3)
  Induction of multi-type HPV (E6/E7)-specific immune responses

- Next Pipeline 2 : Target indication HPV-associated Cancers
  Enhancement of HPV16/18 (E6/E7)-specific immune responses by adjuvant genes

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Development and Business Milestones

Milestones to be achieved in 2019

	1Q	2Q	3Q	4Q
GX-H9			*Ph2 2 year HV data to be released at ESPE*	*Phase 3 IND submission to US FDA*
GX-I7	*Healthy Data to be released at AACR*			*Solid Tumor Ph1b interim Data to be released at SITC*
GX-G3		*Ph2 Final data to be released at ASCO*		
Papitrol-188			*Ph2b results to be released at IGCS 2019*	

Clinical Development

- *GX-I7 :*
  - ✓ *Combo Studies (TNBC, Skin Cancer) : To initiate trials and validate trend of efficacy*
  - ✓ *1~2 additional indications : To get IND approvals and start trials*

Business Development

- *Licence-Out deal of Bio-Better Franchise pipelines*
- *GX-I7: Add more combo studies with top-notch global pharma*

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Financial Information

As of 4Q 2018

(Million KRW)

	2018	2017
Current Asset	177,518	28,892
Total Asset	374,811	140,734
Total Debt	54,304	26,825
Total Equity	320,507	113,909

(KRW)

Numbers for Reference		
Listed # of shares		20,444,934
52 weeks stock price	high	124,100
	low	64.400
2018 R&D Expense		32,715M

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Thank you

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