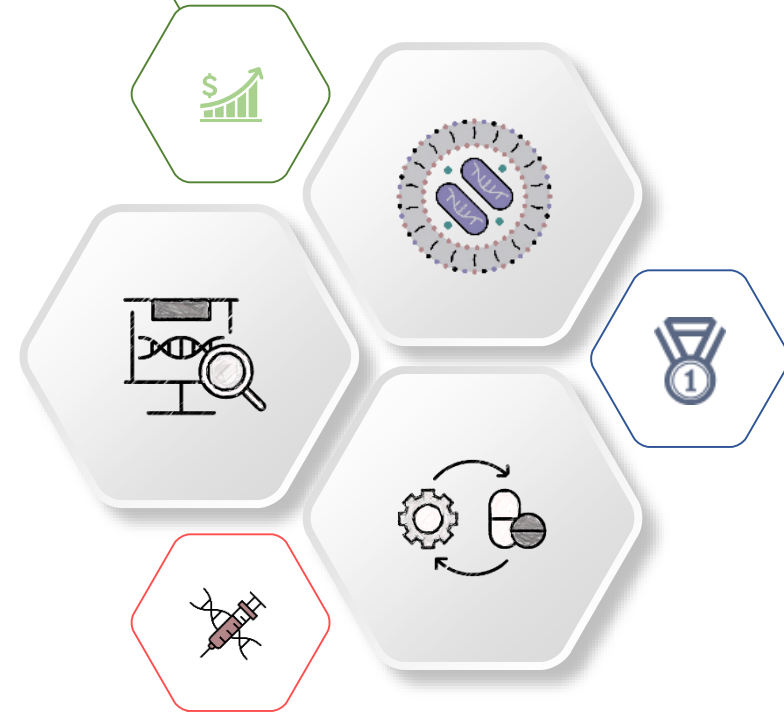


IR Book | Aug. 2022

ST PHARM

Technology Driven Gene therapy CDMO
From Oligonucleotide to xRNA





ST PHARM

During past three decades, ST PHARM has been recognized as a top- tier Oligonucleotide API manufacturer in the world.

We are committed to provide excellent services through continuous investments in R&D and quality, as well as effective communications and close partnerships with the clients.



> Introduction

- Dong-A Socio Group
- History / Facility
- Business Strategy
- Global Family (Affiliates)

> Market

- xRNA Market
- Oligonucleotide
- mRNA

> Business

- Overview
- CDMO
- CRO
- R&D

> Financial Highlight

- Earnings figures
- Other Information
- Appendix



PART 01

Introduction

MISSION (DONG-A SOCIO GROUP)

Infinite challenge for a human being with happiness & health

VISION 2030 (ST PHARM)

The Innovative Company Saving Life



- 3 companies ● listed in Public
- 5,000 people in the Group
- 800 in ST PHARM

HEALTHCARE

NON-HEALTHCARE

ST PHARM

CDMO/CMO/CRO
New Drug Development

Dong-A ST

Prescription Drugs
New Drug Development

DM BIO

Biosimilar
Dong-A & Meiji JVC

Dong-A Pharmaceutical

Over The counter Drugs

Dong-A OTSUKA

Food and Beverage
Dong-A and Otsuka JVC

YONGMA LOGIS

Logistics & Storage

SOO SEOK

Bottles & Packaging

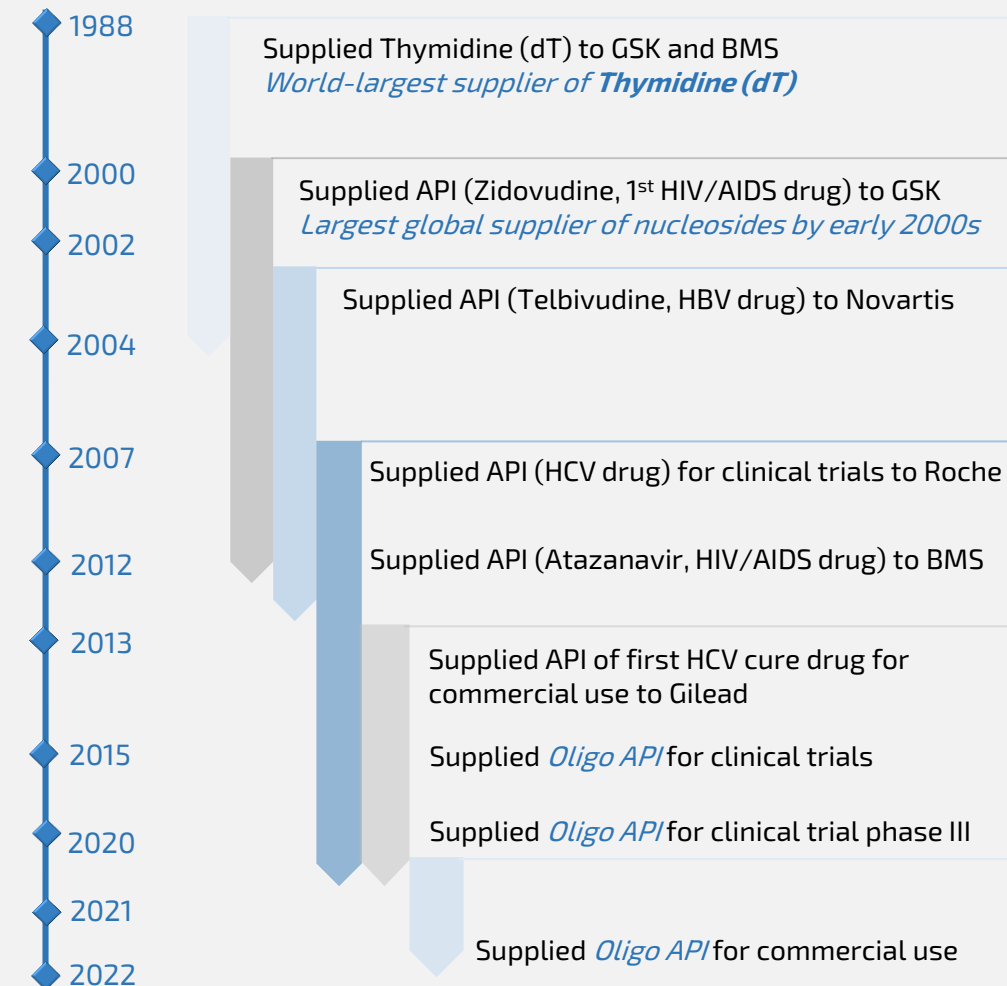
DA INFORMATION

IT Business & Solutions

ST PHARM HISTORY

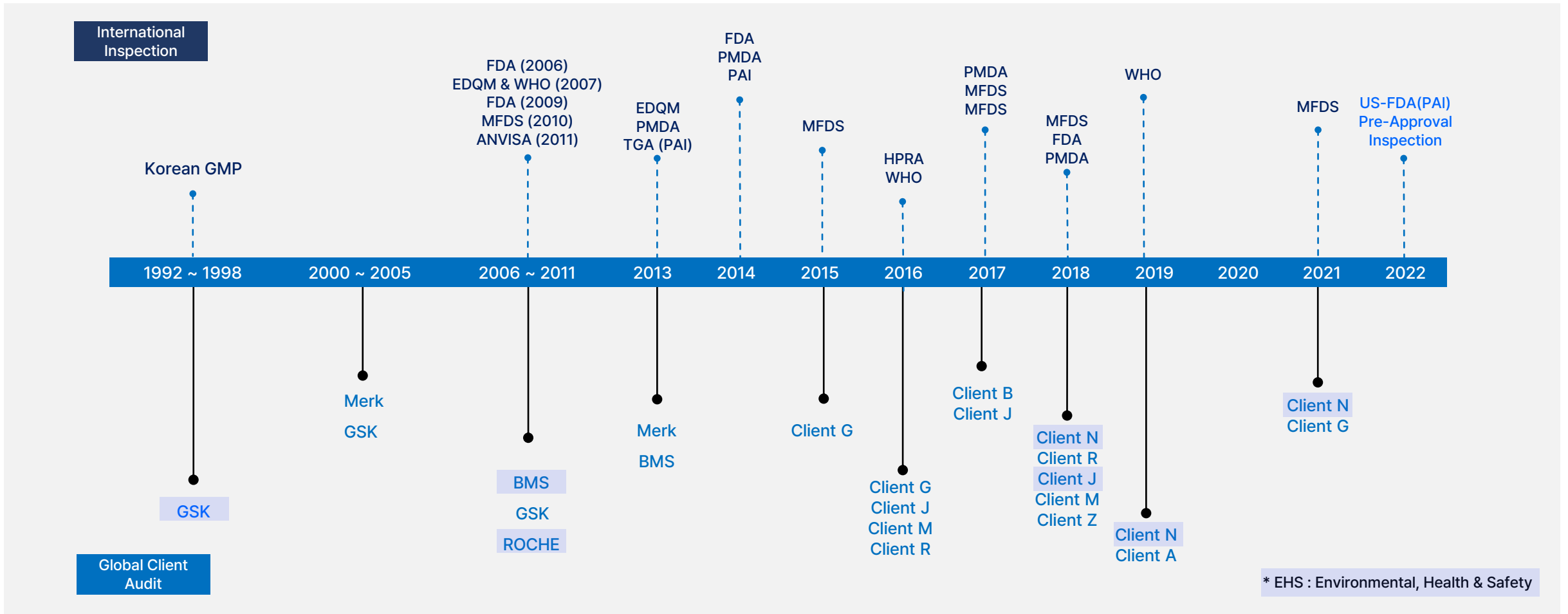
1983	Foundation of Samchully Pharm
2010	Joined Dong-A Socio Group and the corporate name changed to ST PHARM (Science and Technology)
2015	Completed 2 nd Campus (Banwol) FDA(USA) and PMDA (Japan) cGMP Inspection
2016	EU cGMP Inspection/ Established a subsidiary (STAR, USA) Listed (IPO) as a public company (KOSDAQ: 237690)
2018	Commence Oligo GMP Manufacturing at Oligo Banwol Plant (1.8mol) Awarded 2018 Global API Manufacturing (Oligonucleotide) Growth Excellence Leadership by Frost & Sullivan
2019	Acquired two CRO(AnaPath R&S) in Europe STP1002(Colorectal cancer) IND approval (<i>Phase1</i>)
2020	Received 2019 Roche CDMO Award STP0404 (AIDS) IMPD approval (<i>Phase1</i>)
2021	Established <i>LEVATIO</i> and <i>VERNAGEN</i> (USA, RNA biotech) Initiated Mid-scale mRNA GMP facility set up (<i>Banwol Campus</i>) Started development of COVID-19 vaccine (mRNA) Disclosed Oligonucleotide 2 nd plant plan (<i>Banwol Campus</i>)
2022	STP2104 (COVID19, mRNA Vaccine) IND approval (<i>Phase1</i>) Awarded 2022 Global API Manufacturing(Oligonucleotide) Growth Excellence by Frost & Sullivan Completed 1 st & 2 nd Oligo plant expansion (6.4 Mole) STP0404 (AIDS, small molecule) Phase1 completed

SUPPLY RECORD



Introduction

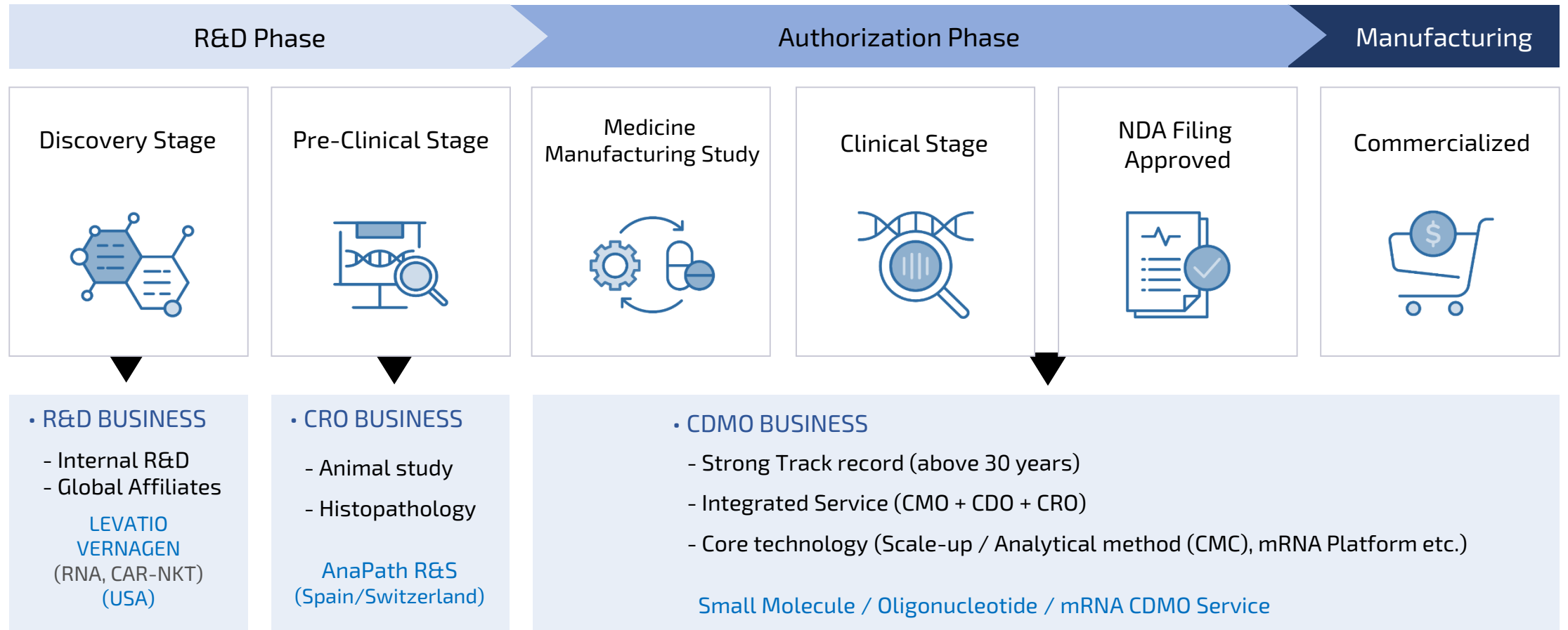
글로벌 인증 및 실사



Successfully Inspected by



Introduction BUSINESS STRATEGY

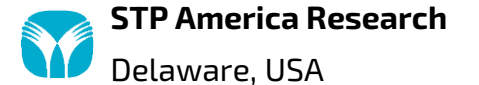
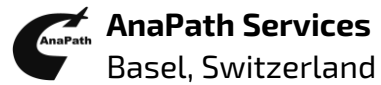


ST PHARM is running CDMO, CRO and R&D and diversifying business portfolio in parallel

Introduction

ST PHARM GLOBAL FAMILY

Seamless Development from Manufacturing to Non-clinical animal safety service





PART 02

Market Overview



Overview

RNA-based therapeutics, fundamentally controlling gene expression (disease-relevant gene), 3rd generation therapy

* ST PHARM has manufactured API (Oligonucleotide) and provided CDMO services.

RNA based drugs

- Type : Anti-sense (ASO), siRNA, mRNA, Aptamer, miRNA etc.

- Approved drugs (e.g.) : 1. Spinraza (Biogen) (SMA) * Sales USD 2.1Billion/year

2. Leqvio (Novartis) Cardiovascular disease

Advantages & Challenges

- Advantages

Rapid and cost effective development (Under 2 years)

Targeting undruggable pathways

Long term effect (Leqvio 2T/annum VS Repatha 1-2T/monthly)

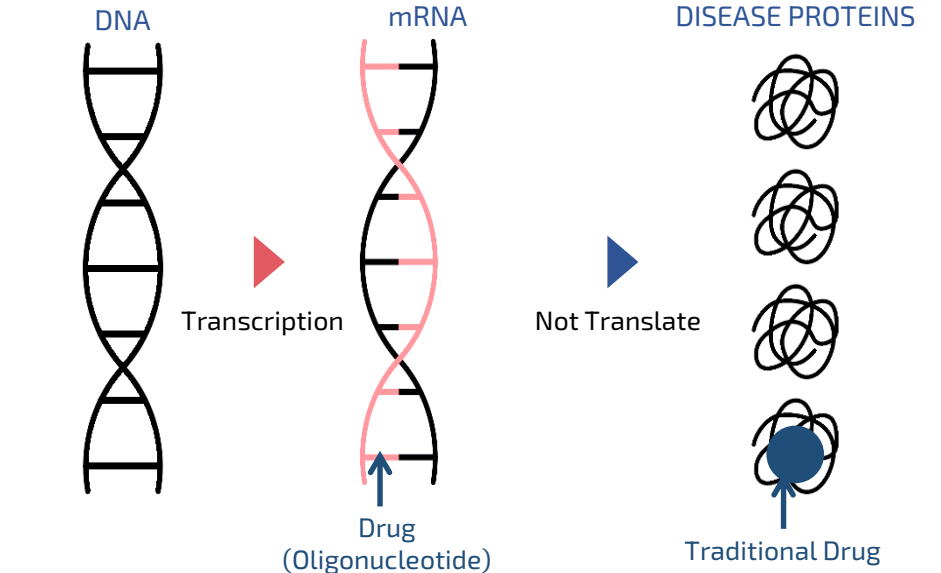
Price (Leqvio below \$4000/annum VS Repatha about \$5850/annum)

- Challenges

Delivery issues (to penetrate specific cell) cf. Liver, Spinal cord, etc

Mass production (Few CDMO in global market)

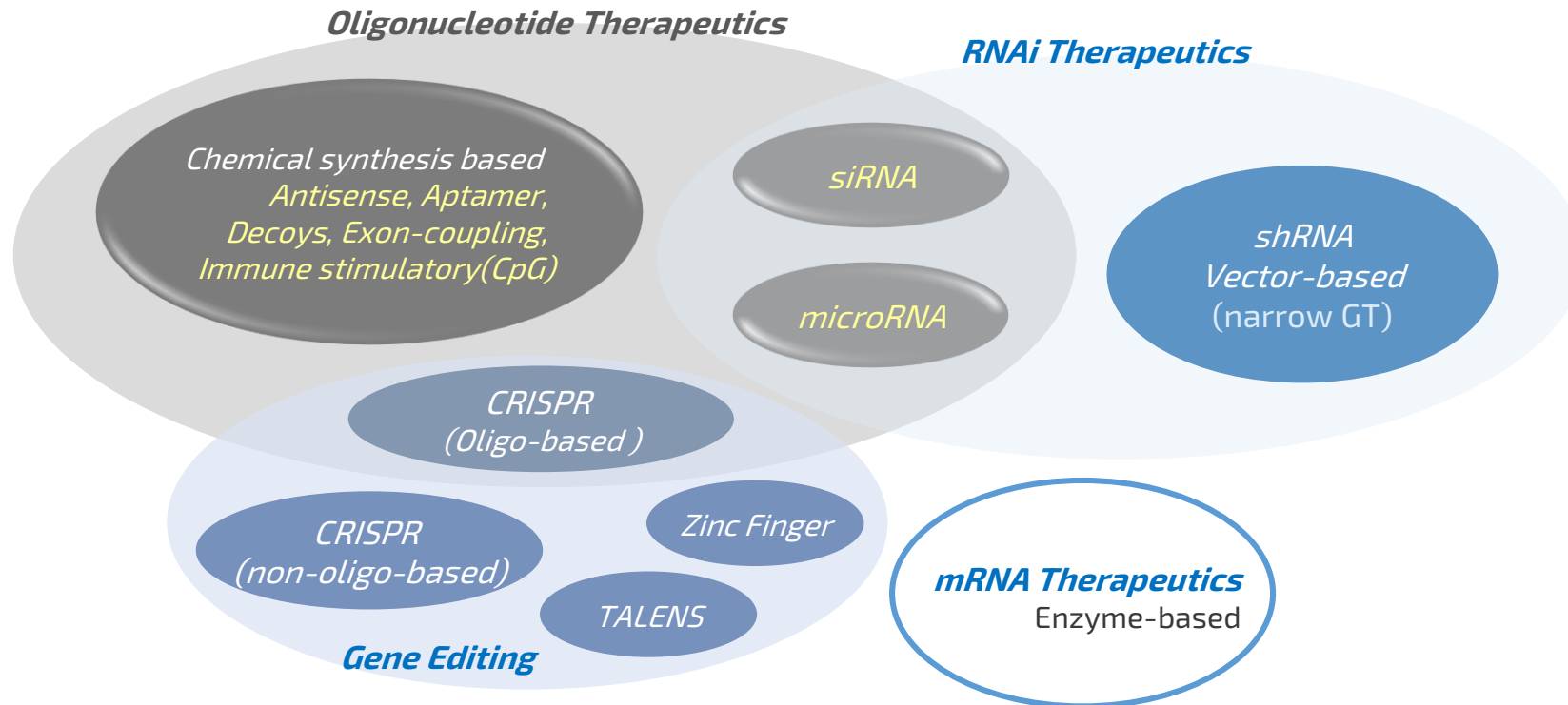
Mechanism of RNA based drug (ASO)
(based central dogma)





▪ TYPES OF GENE THERAPY

Nucleic Acid-based Therapeutics





▪ New paradigm of therapeutics

Recent advances in cellular delivery of RNA drug have enabled development of RNA-based drugs for a broad array of applications, ranging from cancer to pandemic influenza.

▪ RNA therapeutics' market

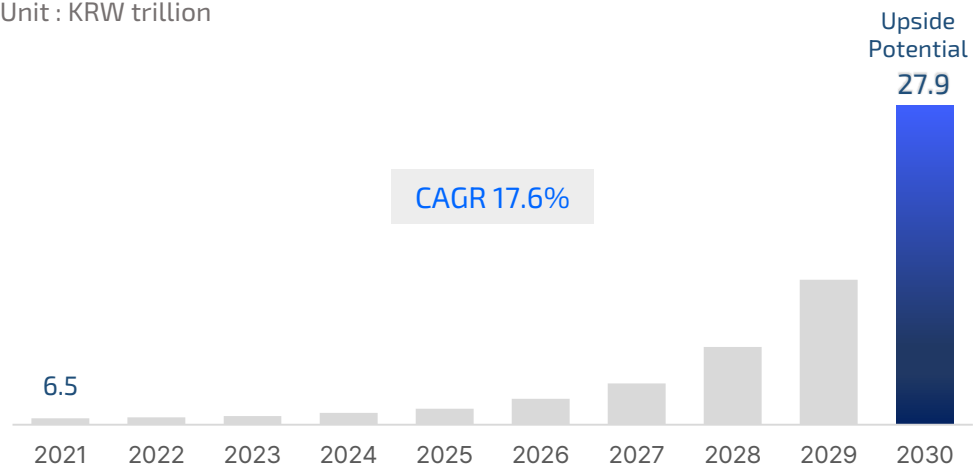
- Global RNA based drug market size :

* 6 KRW trillion (2021) ▶ 28 KRW trillion (2030)

- Delivery technology (ex. Gal-Nac) ▶ Chronic disease drugs

▪ Global RNA based drug market (Except for mRNA vaccines)

Unit : KRW trillion



Source : Allied Market Research

▪ Global Pipelines

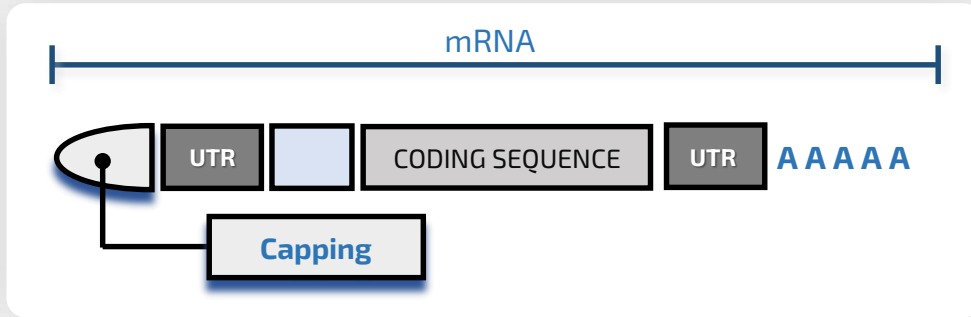
Type	Name	Indication	Company	Approved Year
siRNA	Leqvio	PCSK9 Inhibition (hyperlipidemia)	Novartis	2020
mRNA	Spikevax	COVID-19 Vaccine	Moderna	2020
mRNA	Comirnaty	COVID-19 Vaccine	Pfizer & BioNtec	2020
siRNA	Oxlumo	Hyperoxaluria type 1 (PH1)	Alnylam	2020
ASO	Vyondys 53	Duchenne muscular dystrophy	Sarepta	2019
siRNA	Givlaari	Acute hepatic porphyrias	Alnylam	2019
ASO	Tegsedi	Hereditary ATTR	Ionis	2018
siRNA	Onpattro	Hereditary ATTR	Alnylam	2018
ASO	Spinraza	Spinal muscular atrophy (SMA)	Ionis	2016
ASO	Exondys51	Duchenne muscular dystrophy	Sarepta	2016

Source : Research & Market

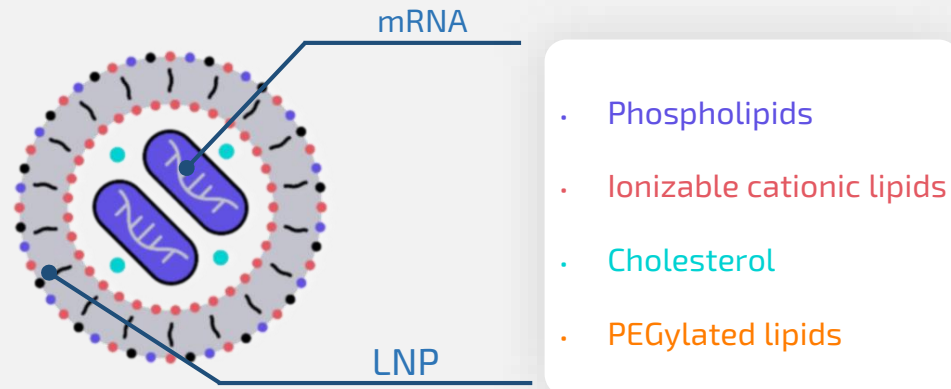


▪ mRNA Platform (Core technology)

1) 5' Capping (Synthesis technology)



2) LNP (Lipid Nanoparticle) – Delivery vehicle

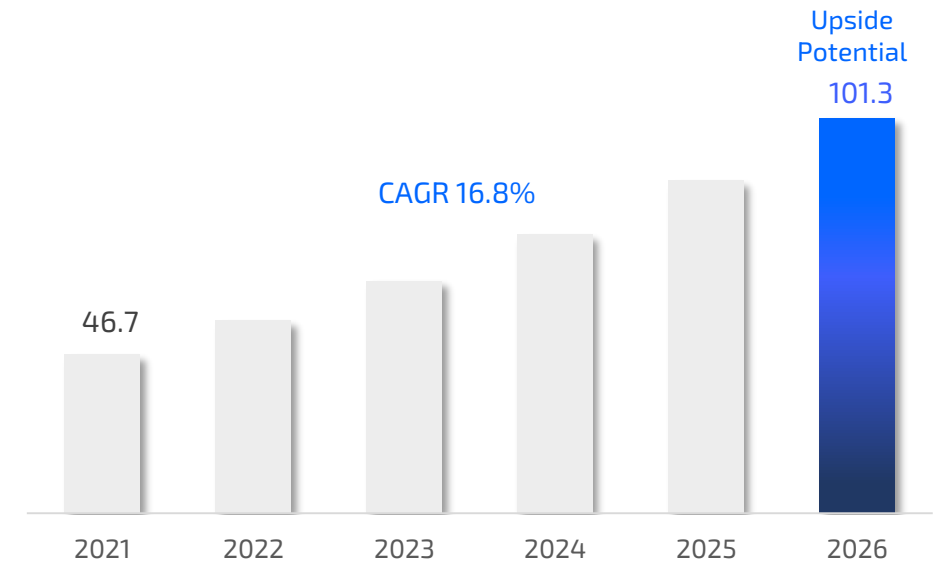


▪ mRNA vaccines & therapeutics market

- The opportunity for rapid development and manufacturing against emerging pathogens, as demonstrated with Covid19 vaccines.
- Rapid drug development (Avg. 10 years ▶ 10 months)
- Increased trend in L/O events

mRNA vaccine & drugs market

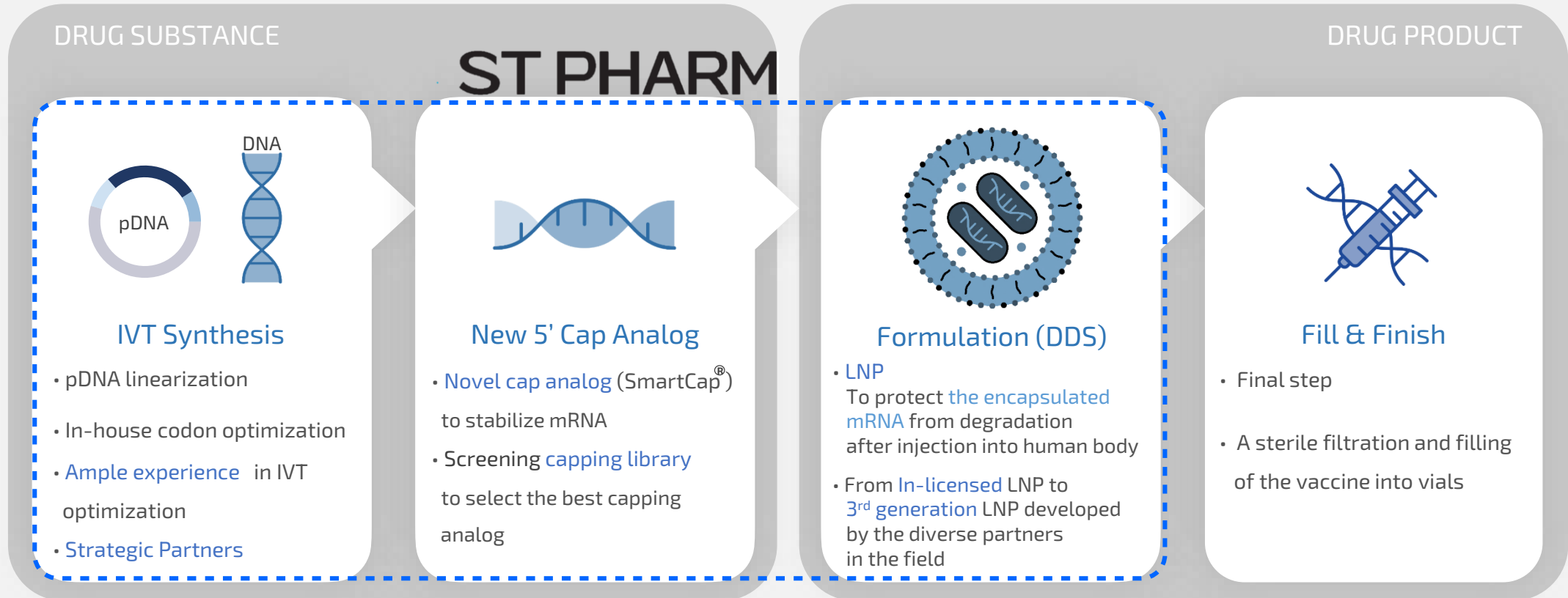
Billions(USD)



Source : ResearchAndMarkets



▪ mRNA manufacturing process



STPHARM connects all aspects of mRNA drug development to clinical and commercialized production



Overview

2020 was a breakout year for mRNA technology platforms with the launch and widespread use of mRNA vaccines for COVID 19.

The global market for mRNA therapeutics grows from \$46.7 billion in 2021 to **\$101.3 billion by 2026** (CAGR 16.8%)

mRNA therapeutics

- Safety/ Specificity (binding to target disease)

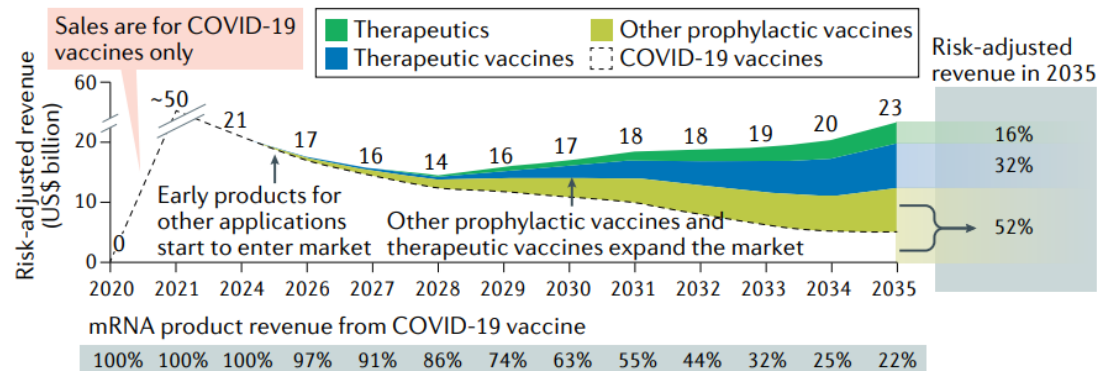
No risk of genomic integration /

Inducing protein coding and inhibiting translation

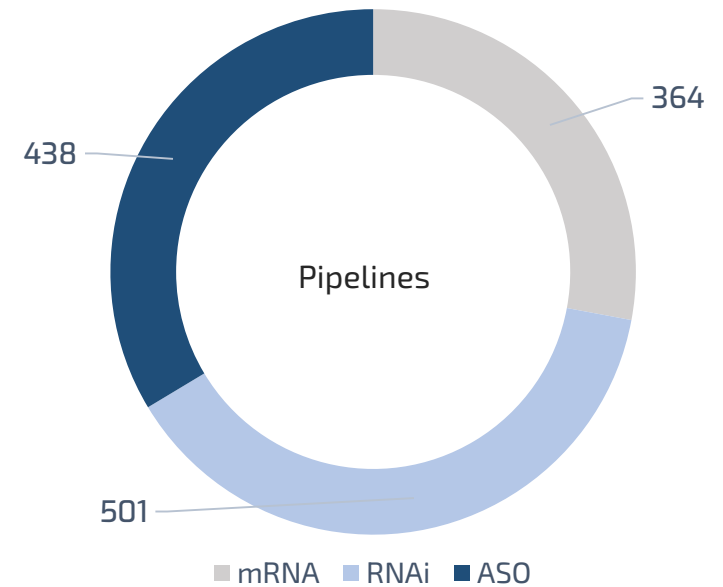
- Capacity for rapid development and potential for low-cost manufacture
- Essential roles in protein expression

Broad applicability in the treatment or prevention of disease

A forecast for the evolution of the market for mRNA technology



RNA Drug Types in Clinical trials



Source : Globaldata, Mirae asset Security



PART 03

Business Overview



- ST PHARM CDMO Strategy



1983. Nucleoside/tide

- Monomer (PNS / PA)
- Zidovudine (AIDS)
- Sofosbuvir (HCV)



2008. Oligonucleotide

- Antisense (ASO)
- siRNA / miRNA
- Aptamer
- Decoys
- Others



2018. Polynucleotide

- mRNA
- circRNA
- samRNA



ST PHARM's Core Strength (Oligonucleotide CDMO)

- Global top-3 positioned service
- The only integrated In-House production capability in the global market (From monomer to oligonucleotide)
- Innovative manufacturing system (ex. Biotransformation technology)
- Strong track record in new drug API manufacture proven in US & Europe (+ 15 years)

Manufacturing Capacity Expansion (disclosed)

- 1st & 2nd expansion : Completed in 2022 2Q
 Installing additional manufacturing trains in Banwol plant
 (Initiate by Apr & June of 2022) * financial support from a global client (2nd)
- 3rd expansion : Additional building (Banwol campus) planned

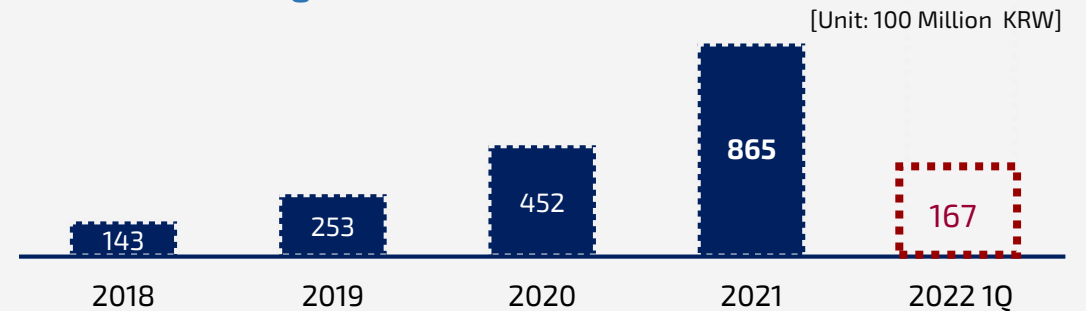
Strong Track Record

- Awarded 2018 Global API Manufacturing Growth Excellence Leadership Award (Frost & Sullivan)
- Awarded 2022 Asia-Pacific Oligonucleotide CDMO Company (Frost & Sullivan)
- Roche CDMO Award 2019
 Oligo New Drug (First in global), Small Molecule New Drug (First in Asia)

ST PHARM's Oligo CDMO projects

Clients	Indication	Stage			
		Phase1	Phase2	Phase3	Commercial
Company N	Hyperlipidemia	●			
Company B	SMA	●			
Company N	CVD	●			
Biotech G	MDS / MF	●			
Company I	CVD	●			
Company J	Hepatitis B	●			
Company G	Hepatitis B	●			
Company B	Hemophilia	●			
Company I	CVD	●			
Company G	NASH	●			
Company R	Hepatitis B	●			

ST PHARM's Oligo CDMO sales

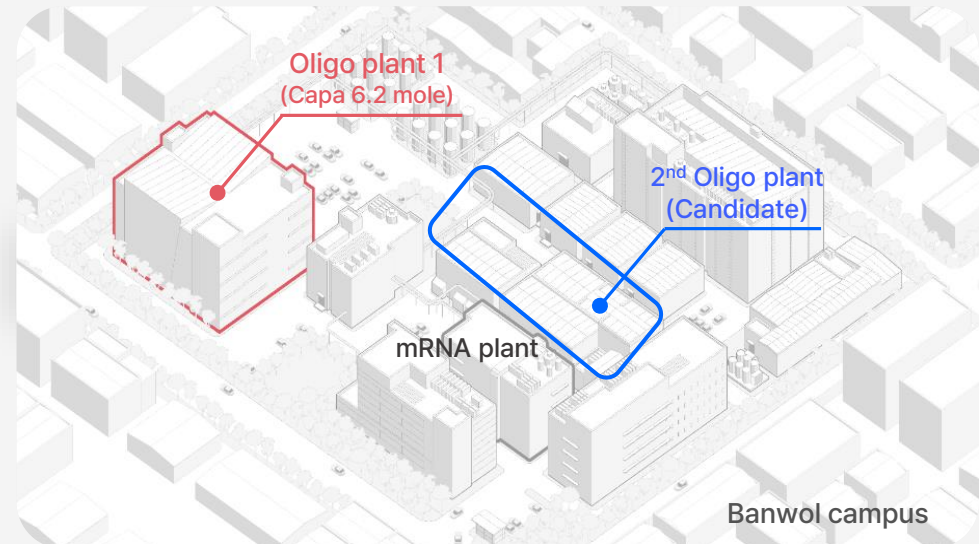
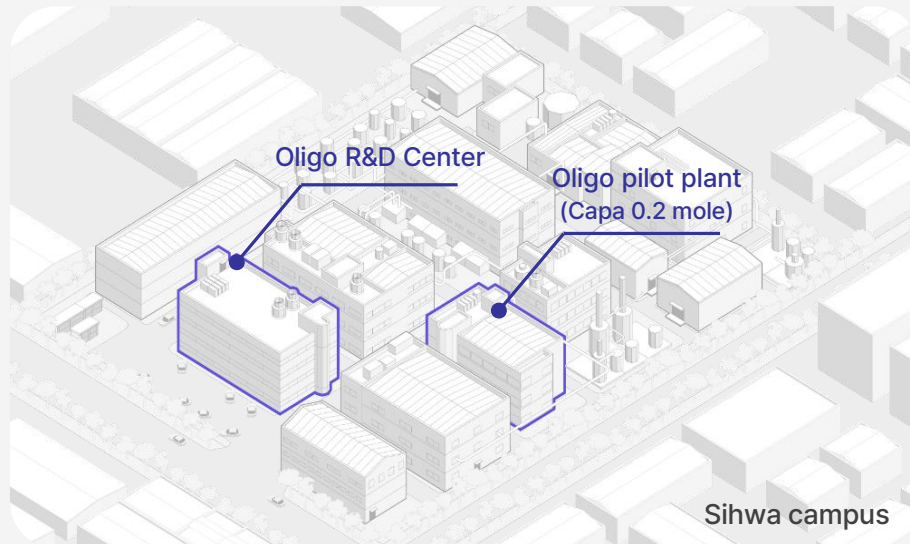




Capacity (Oligonucleotide)

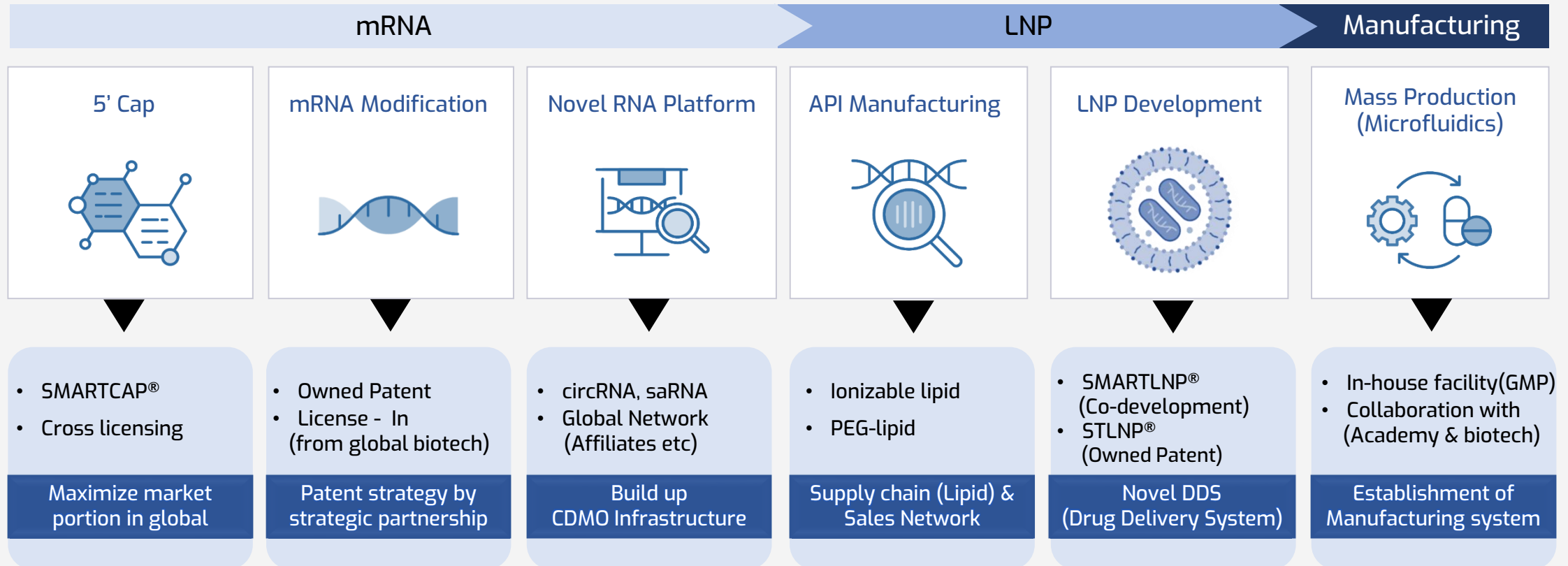
ST PHARM plans to invest in total \$126 million USD to build a 2nd oligonucleotide manufacturing plant.

Oligo production	Current	2022, 3Q	2024, 3Q	2026, 1Q
	1 st Plant	1 st Plant (1 st & 2 nd expansion)	2 nd Plant (1 st stage)	2 nd Plant (2 nd stage)
	2.0 mole (about 500kg)	6.4 mole (1t-3.2t)	10.2 mole (1.7t-5.1t)	14.0 mole (2.3t-7t)
Total CAPA (Facility / Line)	1	4	7	10
	1.0 time	3.2 times	5.1 times	7.0 times





▪ mRNA Business Strategy



Establishment of mRNA CDMO Infrastructure by Technology Internalization (DDS) & Raw material production (Lipid)



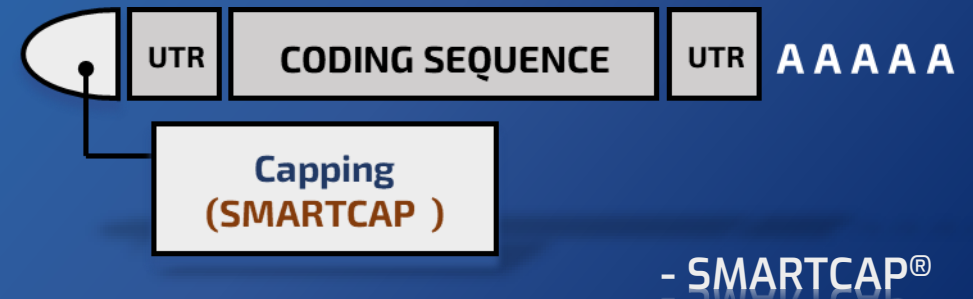
Core Technology

The only company have

1) 5'capping 2) LNP Platform Technology

ST PHARM's own patented Capping technology (SMARTCAP®)

ST PHARM's own patented LNP (STLNP™, SMARTLNP™)



▶ SMARTCAP®

- Stabilizing synthetic technology of mRNA
- Patented in Korea / USA (on going)
- Diverse cap analogues (over 30 types)
- Cost - effectiveness

▶ CAP Library Screening System

- Customized cap analogues
 - ▶ customized client service
- Higher gene expression
 - ▶ flexibly able to control target gene



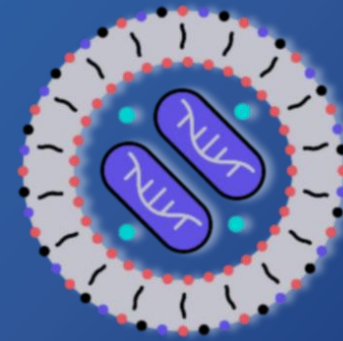
Core Technology

The only company have

1) 5'capping 2) LNP Platform Technology

ST PHARM's own patented Capping technology (SMARTCAP®)

ST PHARM's own patented LNP (STLNP™, SMARTLNP™)



- STLNP™ / SMARTLNP™

STPHARM LNP Strategies

1. In-Licensing LNP

- Proven, unsurpassed technology (applied to Covid19 vaccine)

2. ST Pharm LNP (STLNP™)

- ST PHARM's own patented LNP ('2020)
- Platform for mRNA CDMO

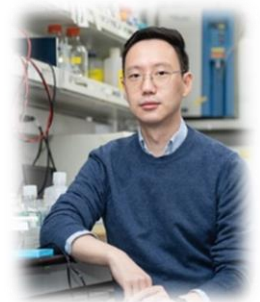
3. Next generation LNP (SMARTLNP™)

- Collaborations with E-HWA Women's Univ. in KOREA
- Improving stability and immune response

LNP study (collaborations with academies)

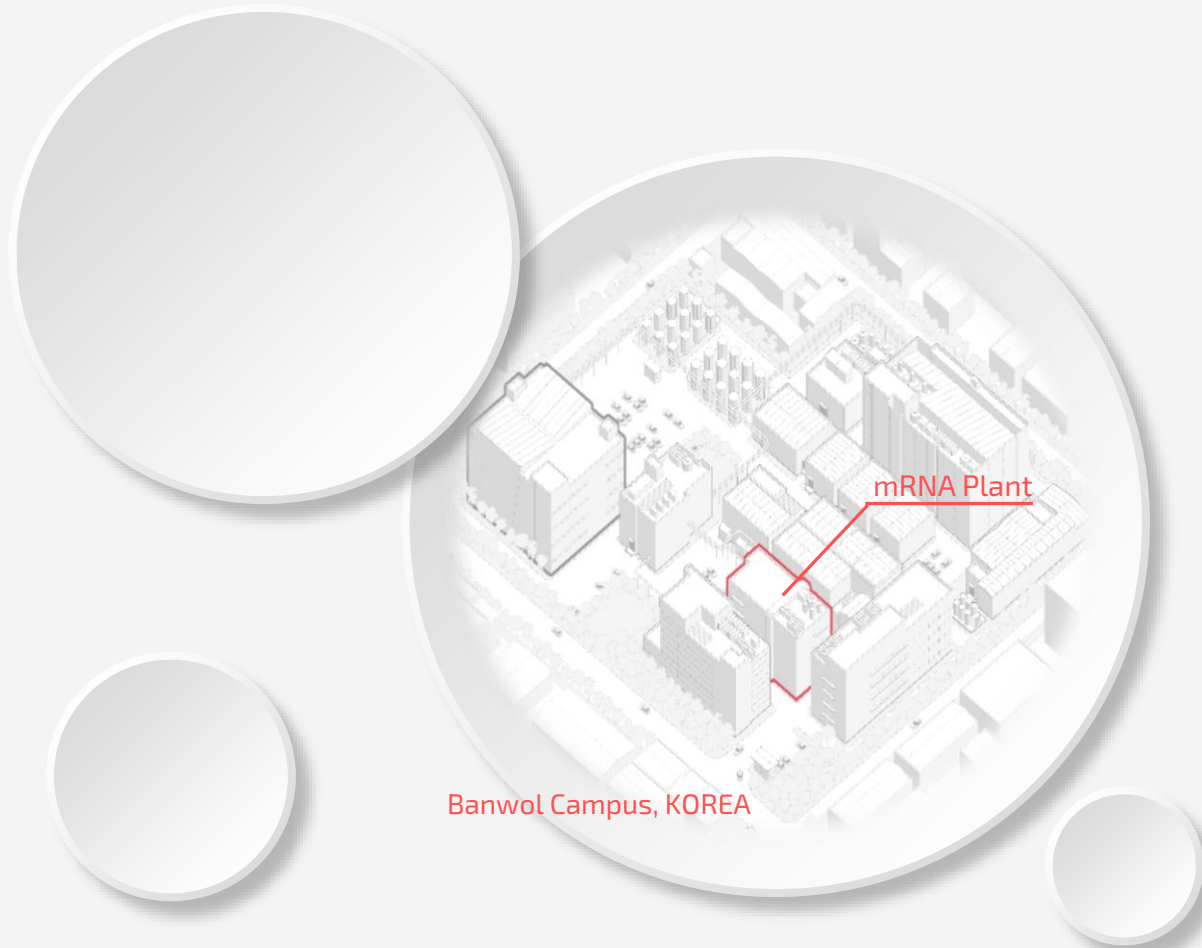
Collaboration with Prof. Hyuk-jin Lee ('21.03)

- Prof. of Graduate school of Pharmaceutical Sciences at Ewha Womans University
- Focused on DNA nanotechnology for drug delivery and molecular diagnostics.
- Development of mRNA-LNP vaccine with ST PHARM (2021.03)





"From milligram to kilogram scale production"



➤ 1. R&D / Small scale production

mRNA plant ,1F (Banwol)

Completion: 2020.08

Capacity : gram / month (for pre-clinical)

➤ 2. Mid-scale production (GMP)

mRNA plant ,1F (Banwol)

Completion: 2021.05

Capacity: mg to multi-gram /month

➤ 3. Large / Commercial scale production (GMP)

mRNA plant, 3/5F (Banwol)

Capacity: 100-120g/month

** Customized facility available as per client's request*



In 2019, Acquired Global CRO company in Europe (Client-dependent CMO ⇒ Client-leading CDMO)
After completion of restructuring in 2020, achieved of turnaround.

▪ AnaPath Research (Barcelona, Spain)

- Established in 1986 (Envigo, Spain)
- AnaPath acquired in Nov. 2019
- Building, 10 thousands sqm, Land, 20 thousands sqm
- More than 800 animals (e.g. monkey, rabbit, dog)

▪ AnaPath Service (Basel, Switzerland)

- CSO : Klaus Weber (Specialized in histopathology)
- The biggest non-clinical CRO in Europe
- GLP Approval (In 2006), Joined EU Safety Alliance
- Up to 1000 experiments (chronic toxicity, carcinogen)



Project Mgmt



Sub-Contract



ST PHARM Virtual R&D

"Minimizing R&D cost and expediting drug development process"
 "Creating a synergy effect with API CDMO business"



Collaboration

Incubation



C&D	A&D
 한국원자력연구원	서울대학교

CxOs

- Strategic Partnership
- Joint Venture
- In/Out-Licensing

ST PHARM Pipelines

"Anti-AIDS drug (First in class) in the world"

Long-term lasting injection type

"Anti-Cancer drug (First in class) in the world"

Curing patients with Kras/Nras mutation and drug resistance (Erbibutux)

Pipeline (Indication)	Partner	Stage		
		Discovery	Pre-clinical	Phase1
STP0404 (Anti-AIDS)	Emory Univ. Colorado State Univ.	—————●		
STP1002 (Anti-Cancer) (Solid Tumor)	Asan Hospital	—————●		
STP2104 (Covid19 vaccine)	In-house	—————●		
NASH	KRICT	—————●		
Oral Heparin	B&L Deli Pharm	—————●		
Anti-virus	KRICT	—————●		
Others (2)	Undisclosed	—————●		

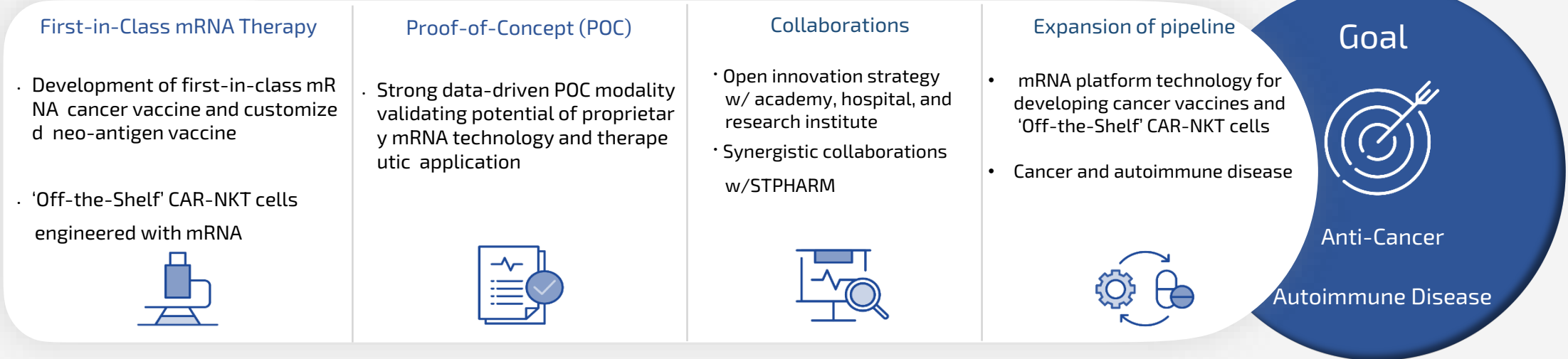


▪ LEVATIO Therapeutics (San-Diego, USA)

- Establishment in San Diego (USA) for mRNA & CAR-NKT therapy
- Based on novel circular RNA platform technology
(With ST PHARM's novel mRNA platform technology)
- Entry into the field of gene, cell therapeutics

▪ Technology

- circRNA + CAR-NKT (* Levatio)
- Cell / Gene therapeutics made by mRNA & circRNA & NKT cell
- circRNA : Excellent stability, Half-period(x2.5) compared to mRNA
- NKT cell : Cells with all the characteristics of T cells and NK cells
(the 4th Lymphocyte)
- * Suitable for mass production (Off-the-shelf)
- * Activating immune system (Adjuvant)





▪ VERNAGEN (Atlanta, USA)

A biotech startup that develop mRNA based therapeutics for unmet needs (infectious & genetic disease)

▪ Purpose

- mRNA based therapy and vaccine (RSV vaccine etc.)
- Alternative drugs (Niche market penetration)
- Strategic partnership in global network

▪ Strategic Plan

LAUNCH (2022 – 2023)

- Set up company
- Develop mRNA vaccines
- Complete Series A funding round

GROWTH (2024 – 2025)

- Establish partnership globally
- Secure mRNA technology
- Diversify profit model (L/O, Data driven collabo.)
- Complete Series B funding round

LEAP UP (2026 – 2028)

- Create VERNAGEN (Brand Identity)
 - Global IPO (In 2028)
- Complete Series C funding round

▪ MAIN PIPELINES

"Phase 1 & 2 in 2024"

Pipeline	Stage		
	Discovery	Pre-clinical	Phase1
RSV mRNA Vaccine	—————●		
Norovirus mRNA Vaccine	—————●		
SFTS mRNA Vaccine	—————●		
Hendra/Nipah mRNA Vaccine	—————●		
mRNA Therapeutic (Others)	—————●		



PART 04

Financial Overview



Achieved record high results in 2022. 1Q : Sales up 35.7%, +97 BN KRW (YoY) driven by Oligo business & CRO

■ P/L (Consolidated)

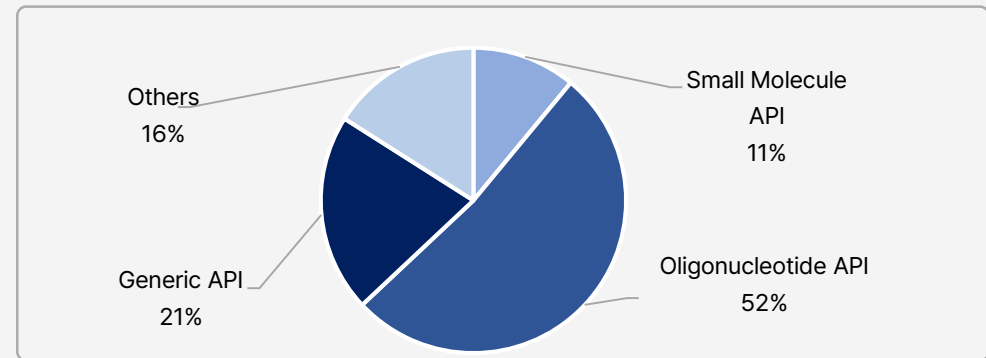
[Unit : Million KRW]

	2022 1Q	2021 1Q	2021	2020	2019
Sales	36,978	27,257	165,642	124,109	93,257
COGS	20,397	22,935	107,899	104,123	94,885
Gross Profit	16,581	4,321	57,743	19,985	-1,628
SG&A	16,044	10,829	52,165	38,802	25,075
Operating Profit	536	(6,507)	5,578	-18,817	-26,703
Net Income	2,144	(5,056)	3,377	-13,154	-18,529
OCI	(1,495)	(295)	1,765	504	-328
CI	649	(5,351)	5,142	-12,650	-18,856

■ Sales breakdown

[Unit : 100 Million KRW]

Business	2022 1Q	2021 1Q	2021	2020	2019	YoY
Small Molecule API	19	28	179	154	118	16.23%
Oligonucleotide API	168	85	865	452	252	91.37%
Generic API	59	90	356	477	457	-25.37%
Others	123	68	267	157	105	70.1%
Total	369	272	1,656	1,242	933	33.3%





■ B/S (Consolidated)

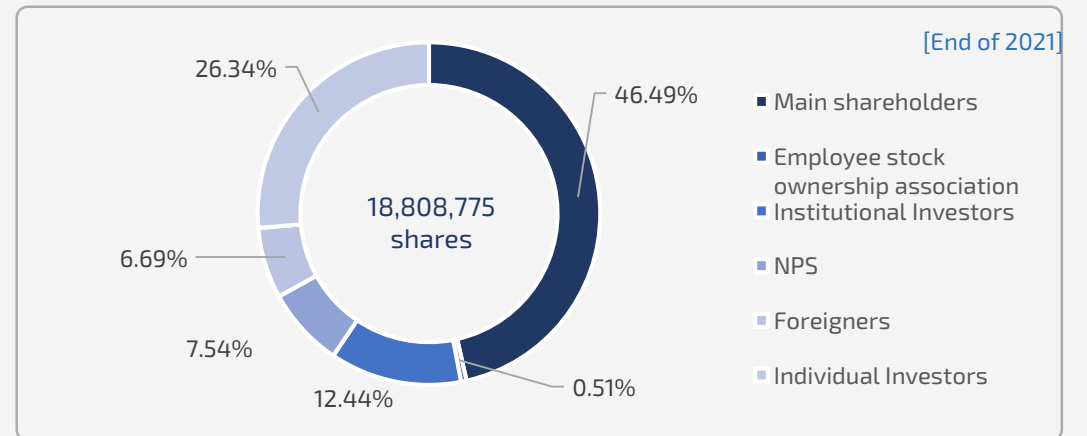
[Unit : Million KRW]

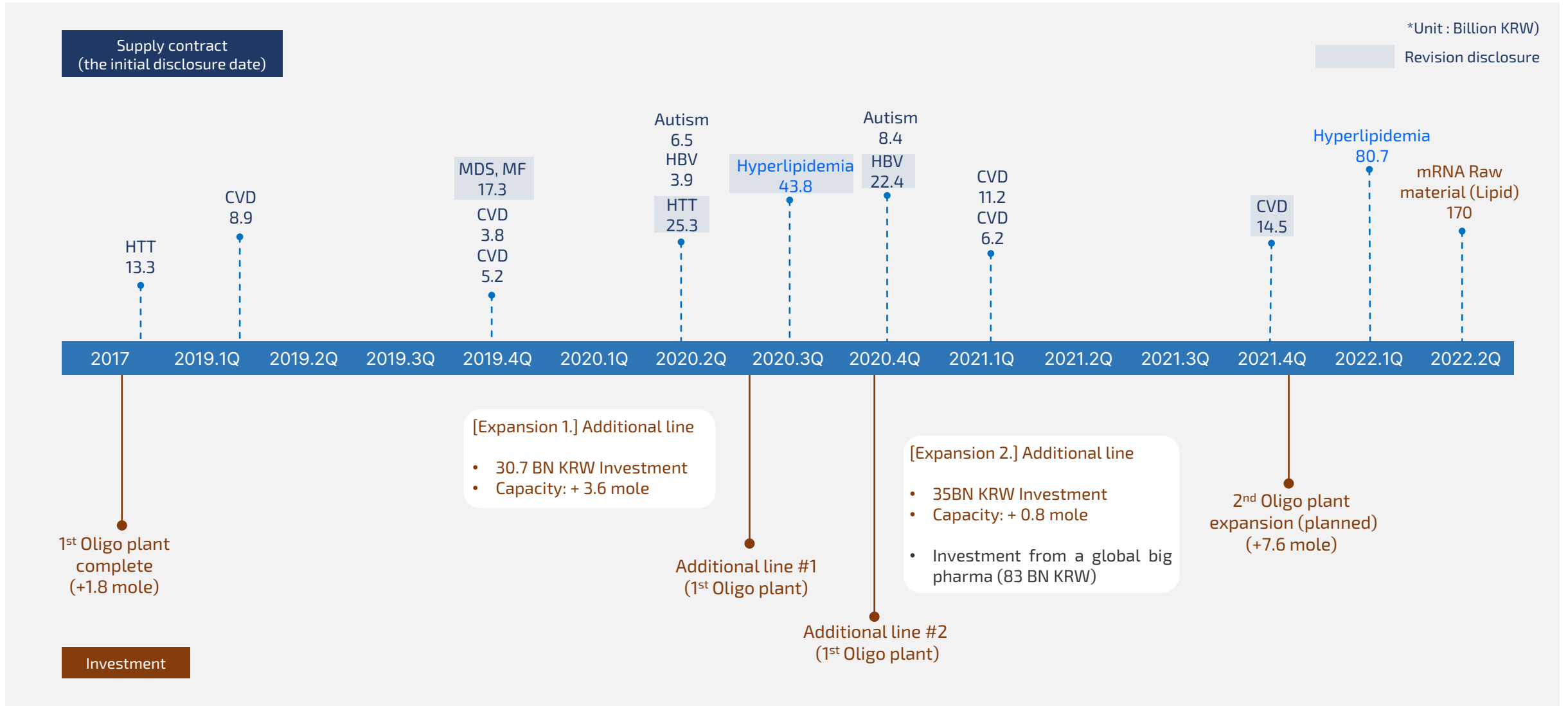
	2021	2020
Current Asset	244,142	235,613
Non-Current Asset	254,423	209,957
Total Asset	498,565	445,570
Current Liability	75,365	18,610
Non-Current Liability	97,167	130,206
Total Liability	172,532	148,817
Parent's Owners Equity	322,974	295,328
Capital stock	9,404	9,328
Paid-in capital stock	186,905	171,287
Capital adj.	11,074	3,079
Retaining Earnings	115,589	111,634
Minority Equity	3,058	1,425
Total Equity	326,033	296,753

■ Shareholders Status

[Unit : Shares, %]

Name of Holders	Shares	Ratio	Note
Dong-A Socio Holdings	6,096,552	32.41%	Majority holder
Jung-Seok Kang	2,475,657	13.16%	Major holder of Holdings
Soo-suk culture foundation	171,600	0.91%	Foundation
NPS (National Pension Services)	1,417,609	7.54%	
Kyung-Jin Kim & 3 holders	9,507	0.05%	Board members
Others	8,637,850	45.92%	
Total	18,808,775	100.00%	





Thank You

ST PHARM

Technology-Driven Gene therapy CDMO
From Oligonucleotide to xRNA

