

Financial Results FY2021 Q2 (January to June 2021)

Carna Biosciences, Inc.



July 2021

Stock Code: 4572



- Initiated dosing in a FIH Phase 1 study of BTK inhibitor AS-1763 in Europe. (April)
- Initiated dosing in a FIH Phase 1 study of CDC7 inhibitor AS-0141 in Japan. (June)
- Announced positive results for AS-0871 Phase 1 Single Ascending Dose study. (July)
- Completed dosing in Phase 1 Single Ascending Dose study of BTK inhibitor AS-1763. (July)
- Bought back and canceled Series 18th Subscription Rights to Shares. (July)
- Issued Series 19th Subscription Rights Shares. (July)



Drug Discovery R&D (ddRD) Business



<Oncology>

Compound	Target	Indication	Discovery/Preclinical	Clinical	Partner
AS-0141	CDC7/ASK	Cancer			
Small Molecule	Kinase	Immuno-Oncology			GILEAD
AS-1763	ВТК	Blood Cancer			
Small Molecule	ALK5	Immuno-Oncology			
Small Molecule	CDK1	Cancer			

*Greater China only

<Other Therapeutic Areas>

Compound	Target	Indication	Discovery/Preclinical	Clinical	Partner
Small Molecule	Kinase	Psychiatry & neurology			Sumitomo Dainippon Pharma
AS-0871	ВТК	Immune-inflammatory diseases			
Small Molecule	N/A	Malaria			
Small Molecule	STING	Immune-inflammatory diseases			

✓ We are actively pursuing early discovery programs to create next wave of pipeline.

BTK Inhibitor Program

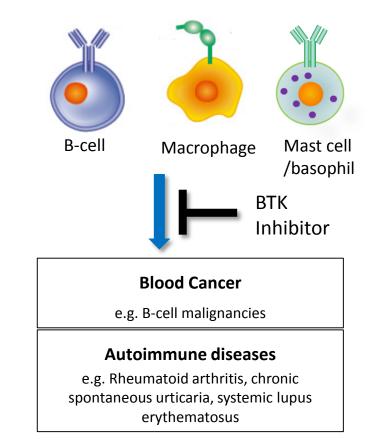
Bruton's Tyrosine Kinase (BTK)

- ✓ BTK is one of the crucial kinases for the B-cell maturation and macrophage activation
- ✓ BTK has been recognized as a validated therapeutic target since the success of Ibrutinib, the first FDA approved BTK inhibitor
- ✓ The expected peak sales of Ibrutinib is > \$10 billion*

<Sales of BTK inhibitors in market>

Launch	Product	Company	npany Target		2026 Est.
2013	Ibrutinib	AbbVie/J&J	Blood cancer	\$8.4B	\$10.7B*1
2017	Acalabrutinib	Astra Zeneca	Blood cancer	\$522M*2	

- In January 2019, Loxo Oncology, developing kinase inhibitors including non-covalent BTK inhibitor LOXO-305, was acquired by Eli Lilly for \$8.0 billion.
- In December 2019, ArQule, developing non-covalent BTK inhibitor ARQ 531, was acquired by Merck for \$2.7 billion.





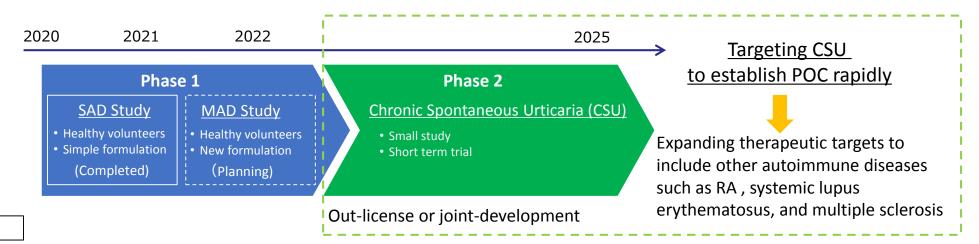
High potential of non-covalent BTK inhibitors for sizable license deals

Source: 1. Evaluate Pharma 2. AstraZeneca Presentation



AS-0871: Targeting Immune-inflammatory diseases						
 Small molecule BTK inhibitor Non-covalent/reversible High kinase selectivity Orally available 	 Demonstrated significant efficacies in arthritis models Showed efficacy in systemic lupus erythematosus model Find a partner to conduct further development after completing Phase 1 study 					
✓ Phase 1 Single Ascending Dose (SAD) study in healthy volunteers was initiated in H2 2020 in the Netherlands, finding AS-0871 was well-						

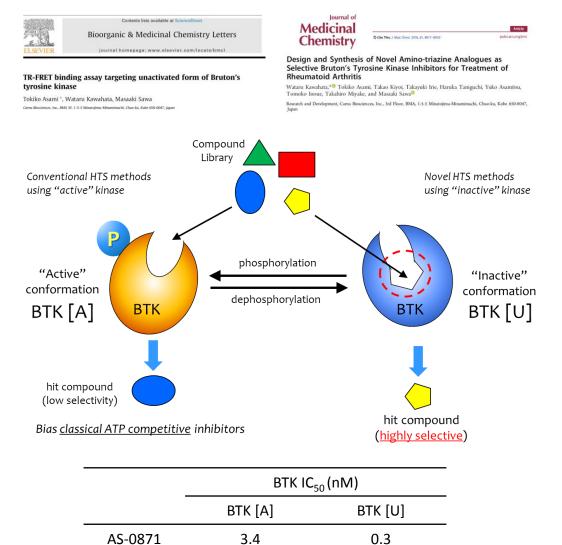
- tolerated without any safety concerns at all dose levels.
- ✓ Multiple Ascending Dose (MAD) study using new drug formulation is planned in H2 2021.
- ✓ MAD study will include a skin prick test to see the potential of AS-0871 for the treatment of Chronic Spontaneous Urticaria (CSU), a disease with high unmet needs.
- ✓ Plan to find a partner for out-licensing or joint-development after completing the MAD study.
- ✓ Potential for autoimmune diseases in addition to CSU.



AS-0871: Excellent Kinase Selectivity

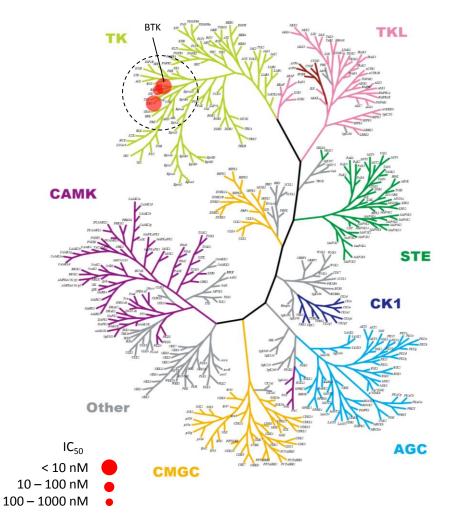


◆ Targeting Inactive Conformation of BTK



◆ Kinase Selectivity Profiling

Only inhibited <u>2 other kinases in a total of 312 kinases</u> tested at 0.3 μ M concentration.

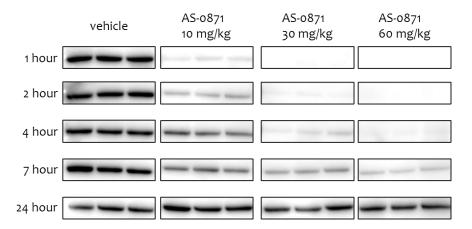


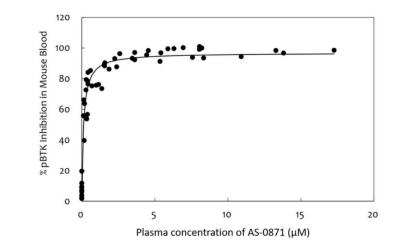
AS-0871: In Vivo Therapeutic Efficacy



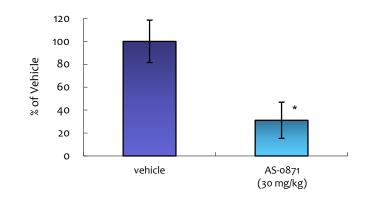
PK/PD Study

Auto-phosphorylation status of BTK was measured following oral single administration of AS-0871

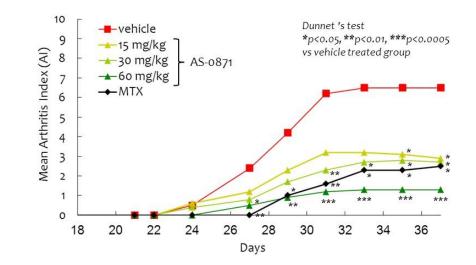




Passive cutaneous anaphylaxis (PCA) mouse model



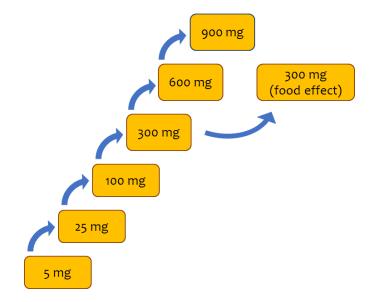
Collagen-induced arthritis (CIA) mouse model





SAD Part (Completed)

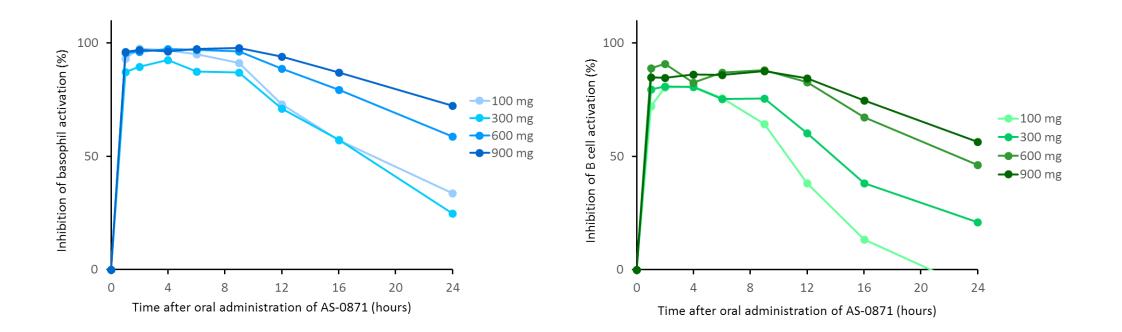
Step 1 Single Ascending Dose Study (SAD)	Step 2
 6 dose levels (8 subjects/cohort) Placebo controlled (6 active / 2 placebo) Safety and tolerability Pharmacokinetics and pharmacodynamics 	• Food effect



- ✓ AS-0871 is well-tolerated without any safety concerns.
- ✓ Favorable pharmacokinetic profile.
- ✓ Blood samples to assess PD effects were analyzed for evaluation of the B-cell and basophil responses. Administration of AS-0871 at 100mg or above resulted in strong inhibition of B-cell and basophil activation.
- Dose selection for the MAD study will be based on the results obtained from the completed SAD study.
- ✓ Switching to a new formulation in the MAD study.

Pharmacodynamics of AS-0871

- Pharmacodynamic study demonstrated that subjects who received AS-0871 showed dose proportional inhibitions in basophil and B-cell activations, and significant and sustained inhibitory effects were observed at 100 mg and above.
- Oral administration of AS-0871 achieved therapeutic plasma levels needed to inhibit B cells and basophils activation, suggesting that AS-0871 has a potential to become a new treatment option for inflammatory diseases.



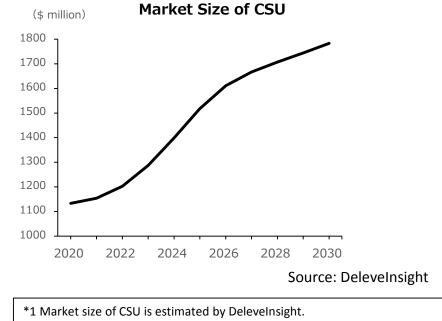
ARNA BIOSCIENCES



- Fenebrutinib is the only non-covalent BTK inhibitor under development targeting autoimmune diseases.
- No non-covalent BTK inhibitors under development targeting Chronic Spontaneous Urticaria.

Compound	Company	Development Phase	
Fenebrutinib (GDC-0853)	Roche / Genentech	P3 Multiple Sclerosis	

- Chronic Spontaneous Urticaria (CSU) is one of most frequent skin diseases with unmet medical needs since curative treatment is not available.
- CSU is a distressing skin disorder that characterized by itching and hives lasting for more than 6 weeks, which has major detrimental effects on quality of life with sleep deprivation and other conditions.
- ✓ An underlying cause is rarely detected and symptoms can be exacerbated by infectious diseases or stress.
- ✓ The lack of efficacy of approved standard therapy (antihistamines) in many patients is another major problems.
- Omalizumab, humanized anti-IgE anti IgE antibodies, has been approved as the third-line therapy, but the drug is very expensive (\$1874 per 4 weeks on average).
- ✓ The market size of CSU in 2020 was estimated as \$1,133 million in major seven countries. The market size excluding antihistamines was \$1,062 million.
- ✓ The market size of CSU is expected to become \$1,783 million in 2030 with launch of several humanized anti-IgE anti IgE antibodies competing with omalizumab.
- ✓ There are no approved BTK inhibitors targeting CSU.



*2 Major seven countries include US, Germany, France, Italy, Spain and Japan.

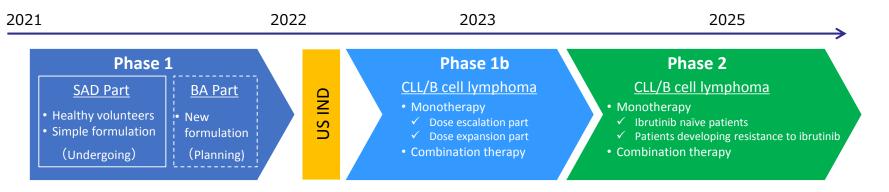
RNA BIOSCIE

AS-1763 : Next Generation BTK Inhibitor Targeting Blood Cancer



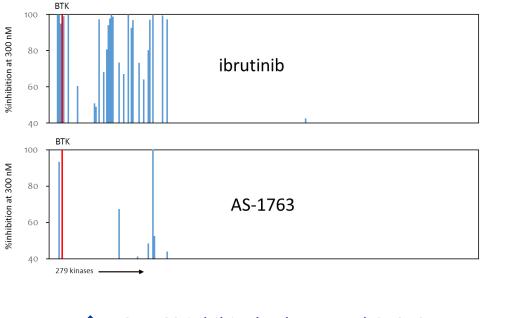
AS-1763: Targeting <u>Blood Cancer</u>							
 Small molecule BTK inhibitor Non-covalent/reversible High kinase selectivity Inhibits both BTK wild type and ibrutinib resistant BTK C481S mutants Orally available 	 Displayed strong anti-tumor effects in lymphoma model with both wild type and C481S mutant BTK Displayed efficacy in immuno-oncology model Potential applications for autoimmune diseases Plan to accelerate the clinical studies utilizing the clinical data of BioNova, the licensee in Greater China 						

- Phase 1 single ascending dose (SAD) study in healthy volunteers was initiated in the Netherlands in April 2021. Dosing in the SAD part has been completed.
- Plan to initiate Phase 1b study in patients with chronic lymphocytic leukemia (CLL)/B cell lymphoma in the U.S. after the completion of the SAD study.
- ✓ Aim to conduct clinical studies efficiently, collaborating with BioNova.

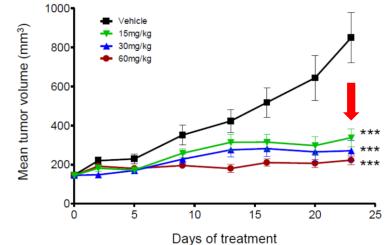




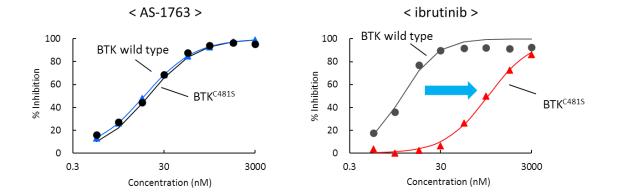
High kinase selectivity



 AS-1763 significantly inhibits tumor growth in a B-cell lymphoma mouse model



AS-1763 inhibits both WT and C481S mutant BTK enzymes



*** P<0.0001



• First generation covalent BTK inhibitors

- ✓ First generation covalent BTK inhibitors including ibrutinib are key therapeutic options for patients with B cell malignancies including chronic lymphocytic leukemia (CLL).
- ✓ Sales of the first generation BTK inhibitors, ibrutinib, acalabrutinib, and zanubrutinib, totaled over \$9 billion in 2020. Sales of ibrutinib is expected to be over \$10 billion according to an estimate by Evaluate Pharma.
- However, patients are reported to develop resistance during the treatment as more first generation BTK inhibitors are prescribed.

(\$million)	Development/ Marketing	2019	2020	2026Est.
Ibrutinib	AbbVie + J&J	7,291	8,433	10,722
Acalabrutinib	AstraZeneca	164	522	n.a.
Zanubrutinib	BeiGene	1	41	n.a.

<Sales of first generation BTK inhibitors>

Source: Financial report of the companies for historical data. Estimate for 2026 is based on EvaluatePharma.



- ✓ Patients treated with ibrutinib are reported to develop resistance during the treatment due to substitution of cysteine residue at 481 position with serine (C481S mutation) in BTK, which prevents the covalent binding of the first generation irreversible BTK inhibitors.
- ✓ AS-1763 significantly abrogates cell proliferation in both wild type and C481S mutant BTK lymphoma cells, strongly suggesting that AS-1763 will be a new therapeutic option for treating patients with B cell malignancies both having wild type and C481S mutation in BTK.
- ✓ Inhibitors for BTK C481S-mediated resistance have not been launched, therefore there is a high unmet medical need for new therapeutic options.
- Two non-covalent BTK inhibitors to treat patients with BTK C481S mutation are currently under development. ArQule and Loxo that originally developed the programs were acquired by big pharma.

Compound	Company	Development Phase
ARQ531	Merck (ArQule)	P2
LOXO-305	Loxo / Lilly	Р3

ARNA BIOSCIEN



AS-0141: Targeting <u>Cancer</u>						
 Small molecule CDC7 inhibitor High kinase selectivity Potential First-in-class drug Orally available 	 Potent anti-proliferative activity against various cancer cell lines Demonstrated strong anti-tumor activity in several human tumor xenograft models Conducting Phase 1 study in Japan targeting solid tumors. 					

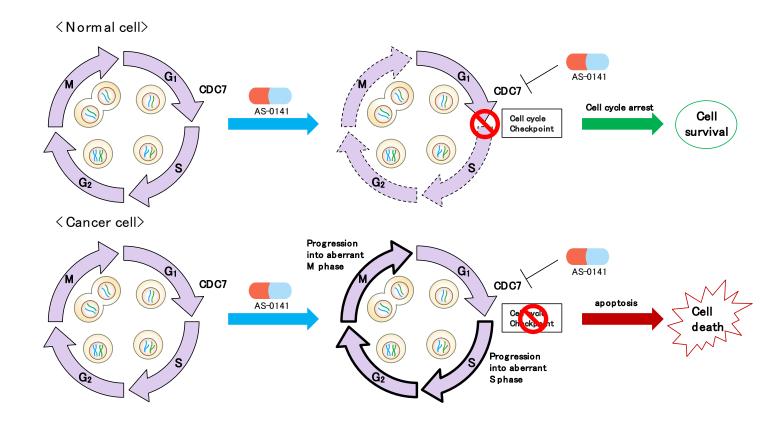
- In H1 2021, Carna initiated Phase 1 study in Japan in patients with unresectable, advanced, recurrent, or metastatic solid tumors.
- ✓ The study consists of two parts, a dose escalation and an expansion.
- ✓ The Phase 1 clinical study of AS-0141 is designed to assess the safety and tolerability of AS-0141 in advanced solid tumors, as well as to identify the recommended Phase 2 dose.



CARNA BIOSCIENCES

CDC7 kinase inhibitor

CDC7 (cell division cycle 7) is a serine-threonine kinase that plays a critical role in DNA synthesis and is required for the activation of DNA replication origins throughout the S phase of the cell cycle. Inhibition of CDC7 in cancer cells causes lethal S phase or M phase progression, whereas normal cells survive, most likely through induction of cell cycle arrest at the DNA replication checkpoint. It has been reported in the literature that CDC7 is overexpressed in many cancers. Therefore, CDC7 is an attractive target for cancer drug development.





Drug Discovery Support (ddSP) Business

Drug Discovery Support (ddSP) Business Q2 Key Highlights

- Sales at the Drug Discovery Support business in Q2 was JPY430 million, down 18.4% yoy.
 - ✓ In North America, sales to Gilead contributed.
 - ✓ In Japan, profiling service and agent business (cell-based assay and X-ray crystallography) were weaker than expected in Q2.
- Robust start for the new service
 - ✓ Launched a full-panel assay service (192 kinds of kinases) for cell-based assay service using NanoBRET[™] technology developed by Promega.
- Expanding lineup of kinase proteins and profiling service
 - ✓ 6 products, including high-demand mutant kinase biotinylated kinases, have been newly added to the line-up and 4 EGFR mutant targets were added to the profiling service.
 - Proposing project-based service to collaborate with clients, leveraging Carna's drug discovery technology.











FY2021 Q2 Results



(JPY million)	FY2020 Q2 Actual	FY2021 Q2 Actual	YoY Change	FY2021 Plan	
Sales	579	430	-149 -25.8%	923	-In line with the FY sales plan. -Received an upfront payment from licensing in Q1 FY2020.
Operating Profit/Loss	(375)	(777)	-402	(1,811)	
Ordinary Profit/Loss	(380)	(774)	-393	(1,816)	
Net Profit/ Loss	(397)	(776)	-378	(1,825)	
R&D Cost	615	877	+262 +42.6%	1,981	-Investment in clinical studies.

Note 1: Rounded down to the nearest million yen.

Note 2: YoY change % for Operating Profit/Loss, Ordinary Profit/Loss, and Net Profit/Loss are not presented since losses were recorded. Note 3: FY2021 plan was disclosed on February 12, 2021.



(JPY million)	FY2020 Q2 Actual	FY2021 Q2 Actual	YoY Change	FY2021 Plan	vs. FY Plan	
Total Sales	579	430	-149 - 25.8%	923	46.6%	
ddSP business	526	430	-96 -18.4%	923	46.6%	In line with the FY sales plan.
ddRD business	53	_	-53	_	_	Received an upfront payment from licensing in Q1 2020.
Total Operating Profit/Loss	(375)	(777)	-402	(1,811)	_	
ddSP business	237	145	-92 -39.0%	207	69.7%	On track vs. FY plan.
ddRD business	(613)	(922)	-309	(2,019)	_	Investment in clinical studies.

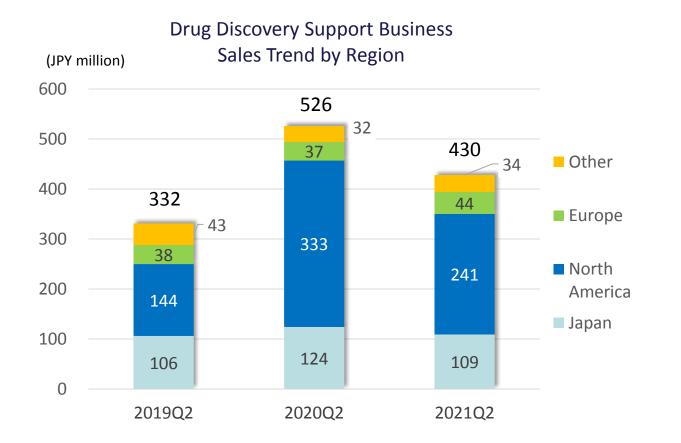
Note 1: Rounded down to the nearest million yen.

Note 2: YoY change % for consolidated operating profit/loss and ddRD operating profit/loss are not presented since since losses were recorded.

Note 3: FY2021 plan was disclosed on February 12, 2021.

Note 4: ddRD: Drug Discovery R&D business, ddSP: Drug Discovery Support Business





- Japan: Decreased 12.4% YoY Sales of kinase proteins were robust. Profiling service and agent business (cell-based assay service and X-ray crystallography) were weak.
- North America: Decreased 27.4% YoY Sales decreased compared to an upbeat sales in Q2 FY2020, but on track vs. plan. Sales to Gilead contributed.
- Europe: Increased 20.5% YoY
 Kinase proteins, profiling service and
 NanoBRET assay service were robust.
- Other: Increased 7.0% YoY Sales in China continued show a recovery.



(JPY million)	As of Dec. 31, 2020	As of Jun. 30, 2021	Change	Reason for changes
Current assets	4,708	3,522	-1,185	
Cash and deposits	4,299	3,213	-1,086	
Non-current Assets	127	140	+13	
Total assets	4,835	3,662	-1,172	
Current liabilities	727	370	-356	
Non-current liabilities	284	195	-89	Long term loans payable -70 Bonds payable -14
Total liabilities	1,011	565	-445	
Total net assets	3,824	3,096	-727	Retained earnings -776
Total liabilities and net assets	4,835	3,662	-1,172	

Shareholders' equity ratio	79.0%	84.5%
BPS	308.0 yen	248.8 yen
PBR	3.9x	5.5x
Share price of Carna	1,212 yen	1,367 yen

Note: Share price is the closing price of the term end.



Cantor Fitzgerald & Co will sell the shares acquired by exercising the subscription rights to overseas institutional investors.

Points

Use of

Funds

Cantor Fitzgerald & Co will not sell the shares acquired by exercising the subscription rights in the market unless Carna permits to do so. Mitigate the impact on the share price

Diversify the types of investors

- 1. Phase 1 Multiple Ascending Dose study of BTK inhibitor AS-0871 planned to be conducted in Europe.
- 2. Phase 1b study in patients with chronic lymphocytic leukemia (CLL)/B cell lymphoma planned to be conducted in the U.S.
- 3. Phase 1 study of CDC7 inhibitor AS-0141 in Japan targeting solid tumors.
- Discovery and inlicensing of new pipelines

R&D expenses to

conduct clinical studies

of our pipelines

- 1. R&D expenses to advance programs in discovery phase to preclinical phase.
- 2. R&D expenses for preclinical studies.
- 3. Expenses to in-licensing new pipelines and for joint research.



Appendix

Business Plan



(JPY million)	FY2020 Actual	FY2021 Plan	Outlook for 2022 - 2025		
Total Sales	1,133	923			
ddSP business	1,080	923	Maintain stable sales.		
ddRD business	53	-	Revenue from milestone payments and upfront payments.		
Total Operating Loss	(1,057)	(1,811)			
ddSP business	458	207	Maintain stable profit while investing in product developments.		
ddRD business	(1,515)	(2,019)	Continue to invest in R&D. Deliver profits depending on the size of milestone payments and upfront payments.		
Ordinary Loss	(1,077)	(1,816)			
Net Loss	(1,111)	(1,825)			
(JPY million)	FY2020 Actual	FY2021 Plan	Outlook for 2022 – 2025		
R&D Cost	1,474	1,981	Invest in R&D (JPY1 bn to 2.5 bn) for the future growth.		
Сарех	68	21	Invest in equipment for R&D and IT system (JPY20 mn to 100 mn.)		
Business plan for FY2021 does not include milestone payments and upfront payments related to license agreements as the timing or the					

* Business plan for FY2021 does not include milestone payments and upfront payments related to license agreements as the timing or the amounts are difficult to predict. Numerical targets for 2022-2025 are not disclosed for the same reason.

ddRD: Drug Discovery R&D busin

Key Milestones



Business		Milestones					
		2020	2020 2021		2022 and after		
AS-0871		✓ Initiate Ph1 (Achieved in Aug. 2020)	Initiate Ph1 MAD study (H2 2021)		Start partnering activity (2022)		
ddRD	AS-1763	 IND submission (CTA submitted in Jan. 2021) 	✓ Initiate Ph1 (Achieved in Apr. 2021)		Initiate Ph1b (2022)		
	AS-0141		✓ Initiate Ph1 (/	Achieved in Jun. 2021)	Initiate Ph1 expansion part (2022)		
	Research program	Bring one or more programs in preclinical stage	Bring one or more programs in preclinical stage				
 Achieve sales target of JPY1,030 mn (Sales of JPY1,080 mn achieved) ✓ Launch new products (27 new products launched) ✓ Expand NanoBRET service (Sales more than doubled) 		 Achieve sales target of JPY920 mn Launch new products Expand NanoBRET service Propose project-based service to collaborate with clients, leveraging Carna's drug discovery technology. 		 Expand kinase protein offering further Grow assay services by adding targets 			
				ddRD: Drug Discovery R&D business ddSP: Drug Discovery Support Business IND: Initial New Drug application in the			

CTA: Clinical Trial Application in Europe



> Advance clinical trials of our innovative pipelines to maximize corporate value

Started internal drug discovery activity	Demonstrated strong capabilities in drug discovery	Maximize the value of pipelines	Continue delivering profits
2010-2015	2016-2020	2021-2025 (Plan)	2026-2030 (Plan)
 Established in-house research capability Established pipeline 	 Out-licensed multiple programs Initiated clinical trials 	 Advance clinical trials of AS-0871, AS-1763, and AS-0141 Milestone payments from the out-licensed programs and deliver profits Initiate pre-clinical and clinical studies of new pipelines 	 Milestone payments and royalty income from the out-licensed programs and expand profits Potential revenue from new license deals Initiate pre-clinical and clinical studies of new pipelines



<ddRD>

✓ Advance clinical trials of AS-0871, AS-1763, and AS-0141

- ✓ Create next wave of pipeline
- ✓ Milestone payments and royalty income from out-licensed programs

- <ddSP>
 Expand sales of in-bouse developed products a
- Expand sales of in-house developed products and services in North America and Asia
- Sustainable sales growth by launching new products and services and reaching new customers
- Generate cash to invest in ddRD

Potential Revenue from Out-licensed Programs



 Carna is in license agreements with the pharmaceutical companies listed below and eligible to receive milestone payments upon achievement of certain development and commercial milestones. Carna will also receive royalties on future net sales.

< License/joint research agreements with	pharmaceutical companies >
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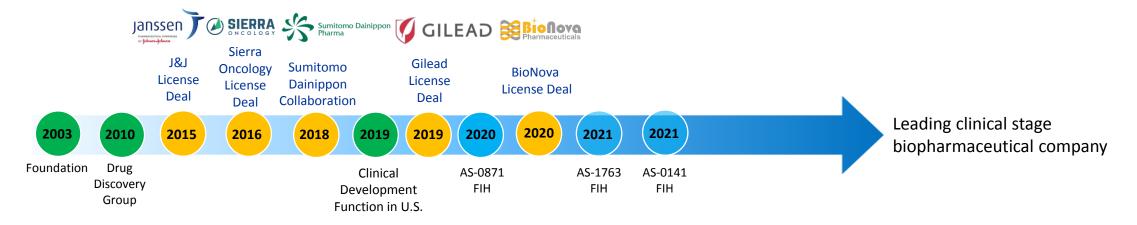
Partner	Compound (Target)	Upfront payment	Total milestone payments expected	Royalty	Region	Contract date
Sumitomo Dainippon Pharma (Joint research)	Kinase inhibitor (Psychiatric and neurological disorders)	JPY80M (including research milestone)	JPY10.6B	Undisclosed	Worldwide	Mar. 2018
Gilead Sciences (Out-license)	Kinase inhibitor (Immuno- oncology)	\$20M	\$450M	Undisclosed	Worldwide	Jun. 2019
BioNova Pharmaceuticals (Out-license)	AS-1763	Undisclosed	\$205M	Up to two digits %	Greater China	Mar. 2020

* The amount and timing of milestone payments as well as royalty rates are not disclosed due to the agreements with the partners.

Building Long-Term Value



Our goal is to deliver innovative therapies for patients suffering from serious diseases



2003 - 2020

- Founding members who had expertise in kinase drug discovery technology spun out from Nippon Organon and established Carna.
- Started offering kinase proteins and screening services to pharmaceutical companies for kinase inhibitor drug discovery.
- In 2010, Drug Discovery Group was established to conduct internal drug discovery.
- Entered into four license agreements and one joint-development agreement with pharmaceutical companies.
- Initiated FIH study of BTK inhibitor AS-0871.

2021 Plan

- Conducting Phase 1 studies of BTK inhibitor AS-0871, AS-1763, and CDC7 inhibitor AS-0141.
- Strengthening global clinical development capability.
- Advance research programs and initiate preclinical development

Long term plan

- Advance clinical studies of AS-0871, AS-1763, and AS-0141 and earn upfront payments and milestone payments from out-licensing the pipelines.
- Receive milestone payments and royalties from licensees and strengthen financial position.
- Create next wave of pipeline.





"Carna" is a goddess of Roman mythology who takes care of human health, protecting the human heart and other organs as well as everyday life, and is said to be the root for the word "cardiac."

The word "biosciences" is derived from the words 'biology' and 'life sciences.'

Carna Biosciences has created contemporary Carna goddess with protein kinase.

Carna Biosciences, Inc.

Corporate Planning BMA3F 1-5-5 Minatojia-Minaimachi, Chuo-ku, Kobe 650-0047 <u>https://www.carnabio.com/</u> ir-team@carnabio.com

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