Corporate Overview

December 2024

Theriva BIOLOGICS

FORWARD LOOKING STATEMENTS

This presentation includes forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. In some cases forward-looking statements can be identified by terminology such as "may," "should," "potential," "continue," "expects," "anticipates," "intends," "plans," "believes," "estimates," and similar expressions, and include statements regarding oncolytic viruses (OVs) being promising cancer therapeutics; the potential of VCN-01 and Theriva OVs and their ability to overcome key OV challenges; clinical advancement of VCN-01 clinical advancement of VCN-01 (including a potential pivotal clinical trial in PDAC); potential expansion of VCN-01 use in different lines of PDAC treatment; potential synergistic antitumor effects of VCN-01 with topoisomerase inhibitors; the potential of VCN-01 to enable immuno-oncology therapies in refractory tumors; the potential to obtain expedited status from the FDA; and the potential of the albumin shield to enhance OV systemic delivery. These forward-looking statements are based on management's expectations and assumptions as of the date of this presentation and are subject to a number of risks and uncertainties, many of which are difficult to predict that could cause actual results to differ materially from current expectations and assumptions from those set forth or implied by any forward-looking statements. Important factors that could cause actual results to differ materially from current expectations include, among others, Theriva Biologics' product candidates demonstrating safety and effectiveness, as well as results that are consistent with prior results, the ability to initiate and complete clinical trials on time and achieve the desired results and benefits, continuing clinical trial enrollment as expected, the ability to obtain regulatory approval for commercialization of product candidates or to comply with ongoing regulatory requirements, regulatory limitations relating to Theriva Biologics' ability to promote or commercialize their product candidates for the specific indications, acceptance of product candidates in the marketplace and the successful development, marketing or sale of Theriva Biologics' products, developments by competitors that render such products obsolete or non-competitive, Theriva Biologics' ability to maintain license agreements, the continued maintenance and growth of Theriva Biologics' patent estate, the ability to continue to remain well financed, and other factors described in Theriva Biologics' Annual Report on Form 10-K for the year ended December 31, 2023 and its other filings with the SEC, including subsequent periodic reports on Forms 10-Q and 8-K. The information in this presentation is provided only as of the date of this release, and Theriva Biologics undertakes no obligation to update any forward-looking statements contained in this release on account of new information, future events, or otherwise, except as required by law.

OVERVIEW

- Theriva Biologics is developing unique oncolytic viruses optimized for systemic administration
- VCN-01 is undergoing a Phase 2b clinical trial in first-line metastatic pancreatic cancer in combination with SoC chemotherapy
- VCN-01 Phase 1 clinical trials support multiple additional indications (retinoblastoma, HNSCC, CRC) and combinations (immunotherapies)
- Albumin Shield™ platform and innovative VCN-X oncolytic virus discovery engine enable development of a distinct product pipeline

Financial Snapshot	
Exchange	NYSE American
Ticker	TOVX
Cash (09/30/2024)	$16.4M
Projected cash runway	Q2 2025
Average Daily Volume (3M Ave)	3.4M
Locations	Rockville, MD Barcelona, Spain

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CRC colorectal cancer. HNSCC head and neck squamous cell carcinoma. SoC standard of care. Immunotherapies include immune checkpoint inhibitors and CAR-T cells.

SEASONED LEADERSHIP TEAM

Steven Shallcross

Chief Executive Officer, Chief Financial Officer

Served as the Company's CEO since 2018 and CFO since joining the Company in 2015

Deep operational, financial and international biotech industry experience and proven track record of leading the financial development and strategy in the public sector

Manel Cascalló PhD

General Director, EU Subsidiary

Expertise in oncolytic adenovirus clinical development, received several patents for the use of adenovirus as antitumoral agents and authored many peer-reviewed scientific publications

Deep regulatory experience and serves as an independent expert for the European Medicines Agencies (EMA)

Vince Wacher PhD

Head Corporate Development

Nearly 30 years leading corporate strategy, partnering, research, clinical development, and intellectual property programs for start-ups, small companies, and new business units within large companies

Development experience across oncology, infection, GI, metabolic diseases, transplantation, and drug delivery

Senseonics

VANDA PHARMACEUTICALS INC.

Innocoll

nuo THERAPEUTICS

VCN BIOSCIENCES

EASTMAN

Verva Pharmaceuticals

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THERIVA PIPELINE

Candidate	Target	Pre-IND	Phase 1	Phase 2	Phase 3	Collaborators	Status*
VCN-01 Selective, Stroma Degrading OV	Pancreatic Cancer (IV) with gemcitabine/nab-paclitaxel						Phase 2b Study On-going Orphan Drug Designation US, EU Fast Track Designation US
	Retinoblastoma (IVit)					Sant Joan de Déu Hospital Materno-Infantil Universitat de Barcelona	Phase 1 Complete, CSR in preparation Orphan Drug Designation US, EU Rare Pediatric Disease Designation US
	HNSCC (IV) + durvalumab					ICO Institut Català d'Oncologia	Phase 1 Complete, CSR in preparation
	Solid Tumors – Brain, Ovarian, PDAC (IV)					LEEDS; Penn Medicine	Phase 1 Studies On-going
VCN-X and Albumin Shield OVs	Solid tumors (IV)					ICO Institut Català d'O; IDIBELL	Preclinical Studies On-going
SYN-004 [1,2] Oral β-lactamase	Prevention of aGVHD in allo-HCT					Washington University in St. Louis	Phase 1b/2a On-going
SYN-020 Oral IAP	Potential indications include NAFLD/NASH, celiac, radiation enteritis					MGH Massachusetts General Hospital	Phase 1 Studies Complete

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*Based on Management's current beliefs and expectations. aGVHD acute graft-vs-host disease; allo-HCT allogeneic hematopoietic cell transplant. CSR clinical study report. IAP recombinant bovine intestinal alkaline phosphatase. HNSCC head and neck squamous cell carcinoma. IV intravenous. IVit intravitreal.

VCN-01 IS A UNIQUELY ENGINEERED HUMAN ADENOVIRUS 5

Systemic

Access primary and **metastatic** lesions
High dose, highly replicating

Selective

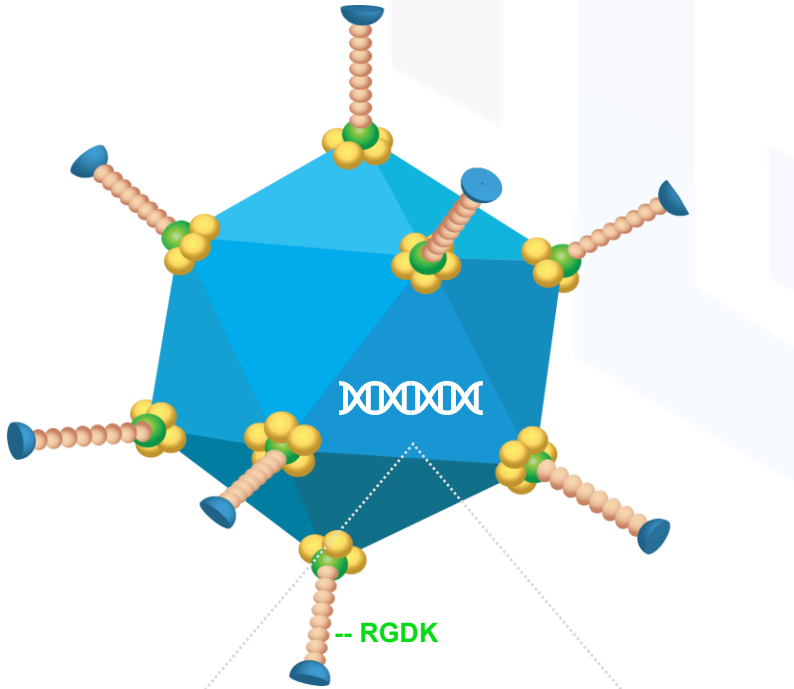
Replicates only in **tumor** cells
Liver detargeted

Stroma Degrading

Expresses **PH20** (hyaluronidase)
after viral replication cycle

Self Reporting

PH20 in blood is a potential **biomarker**
for virus replication in tumors



E2F binding +++ → E1a-Δ24 → MLP → PH20

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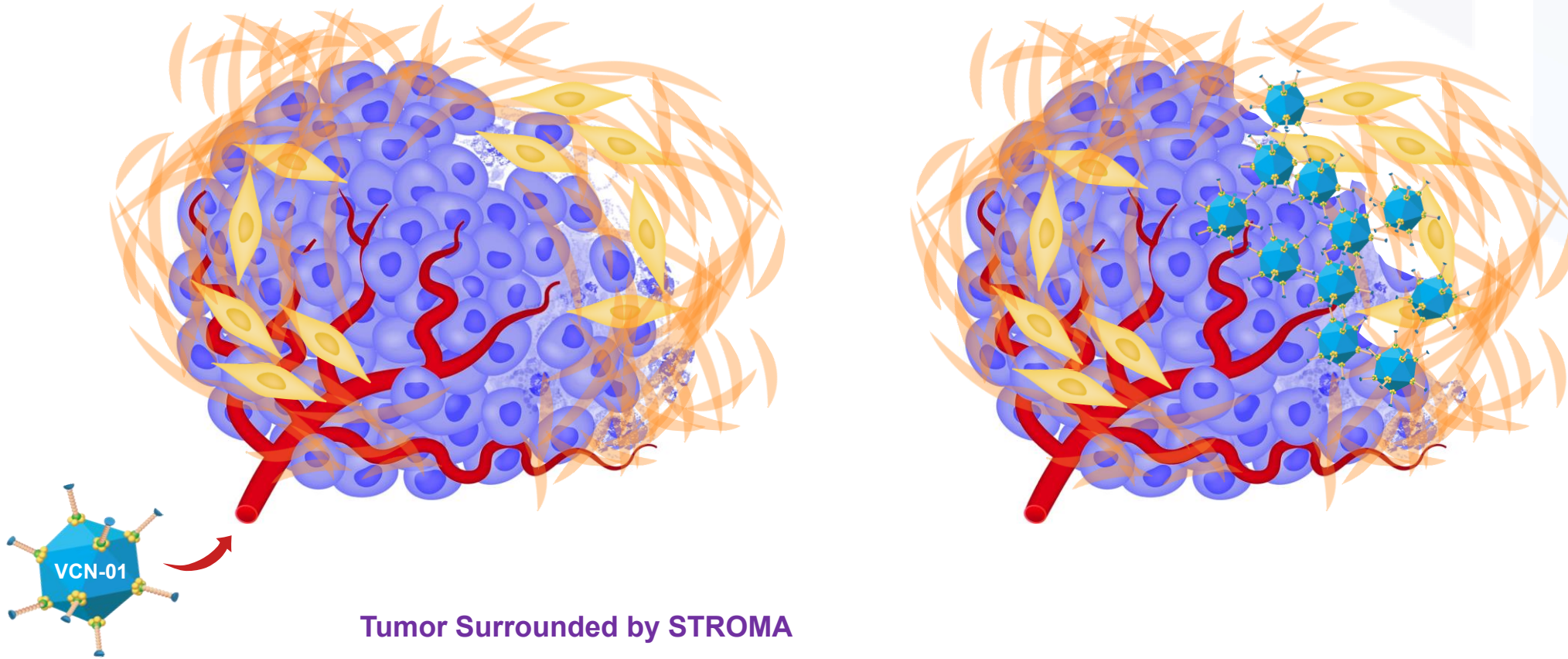
Replication enhanced by significantly increased E2F binding. E1a-δ24 gene deletion means replication only in cells with a defective Rb-E2F pathway. Fiber shaft RGDK modification. PH20 soluble human testicular hyaluronidase enzyme expression is under control of the virus major late promoter (MLP).

VCN-01 IS A UNIQUELY ENGINEERED HUMAN ADENOVIRUS 5

1 **SYSTEMIC** administration enables VCN-01 access to primary tumor and metastases and detargets the liver

2 **SELECTIVE** replication at very high levels lyses tumor cells directly without harming healthy tissues



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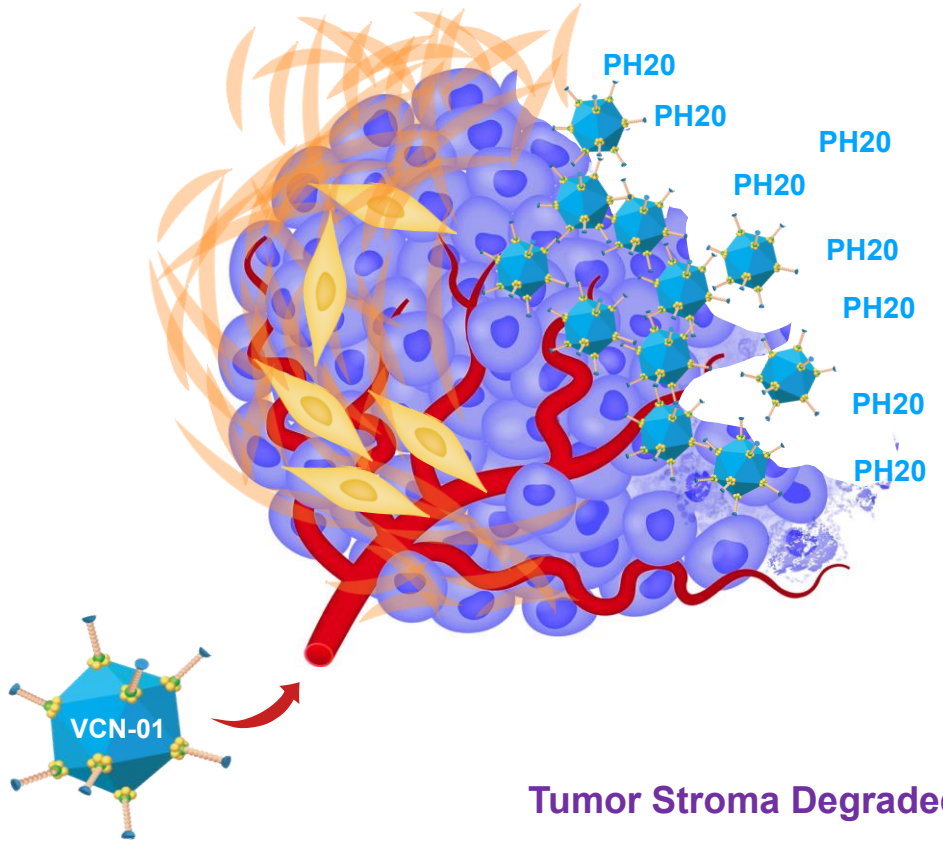
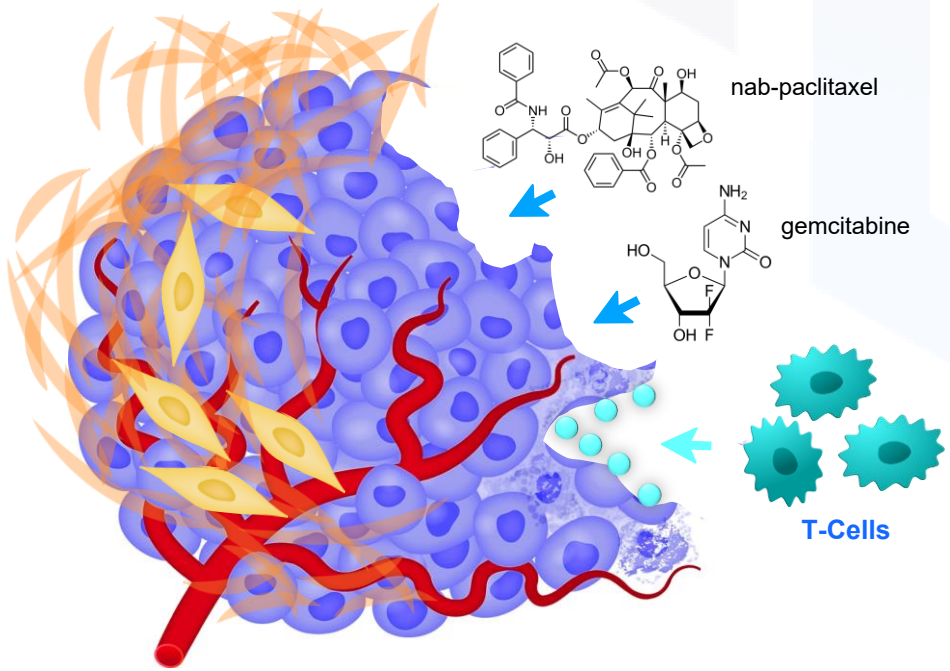
VCN-01 DESIGNED TO HAVE MULTIPLE ANTI-TUMOR ACTIONS

3 **STROMA** degradation by PH20 facilitates tumor access and destruction by coadministered cancer therapies



4 **IMMUNOGENIC** actions of VCN-01 turn “cold” tumors “hot” and elicit an anti-tumor immune response



Stroma

Cancer Associated Fibroblast

Neoantigen

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VCN-01 COMPARED TO OTHER ONCOLYTIC VIRUSES IN DEVELOPMENT

COMPANY	THERIVA BIOLOGICS	CG ONCOLOGY	GENELUX	ONCOLYTICS BIOTECH	REPLIMMUNE
Ticker	NYSE MKT: TOVX	NASDAQ: CGON	NASDAQ: GNLX	NASDAQ:ONCY	NASDAQ: REPL
Market Cap[1]	$3.5M	$2.3B	$86M	$74M	$984M
Product	**VCN-01**	**CG0070**	**Olvi-Vec**	**Pelareorep**	**RP1, RP2**
Virus	Adenovirus 5	Adenovirus 5	Vaccinia	Reovirus	Herpes Simplex
Type	DNA	DNA	DNA (enveloped)	RNA	DNA (enveloped)
Tumor selectivity mechanism	Selective replication (Rb-E2F dysfunction)	Selective replication (Rb-E2F dysfunction)	Low tumor IFN TK deletion	Low tumor IFN Ras activation	Low tumor IFN ICP34.5 deletion
Therapeutic Transgene	PH20	GM-CSF	..	..	GM-CSF, GALV-GP R(-), anti-CTLA-4
Lead Indication (Ph)	Pancreatic (2b)	Bladder (3)	Ovarian (3)	Pancreatic, GI (2b)	Melanoma (3)
Route	IV	IVESIC	IP	IV	IT
Dose	$1x10^{13}$ vp[2]	$1x10^{12}$ vp	$3x10^{9}$ pfu	$4.5x10^{10}$ $TCID_{50}$	$1x10^{7}$ pfu/mL
Stroma Degrading	Yes	No	No	No	No
Biomarker	PH20	..	β-GAL, β-GLU, GFP	..	..

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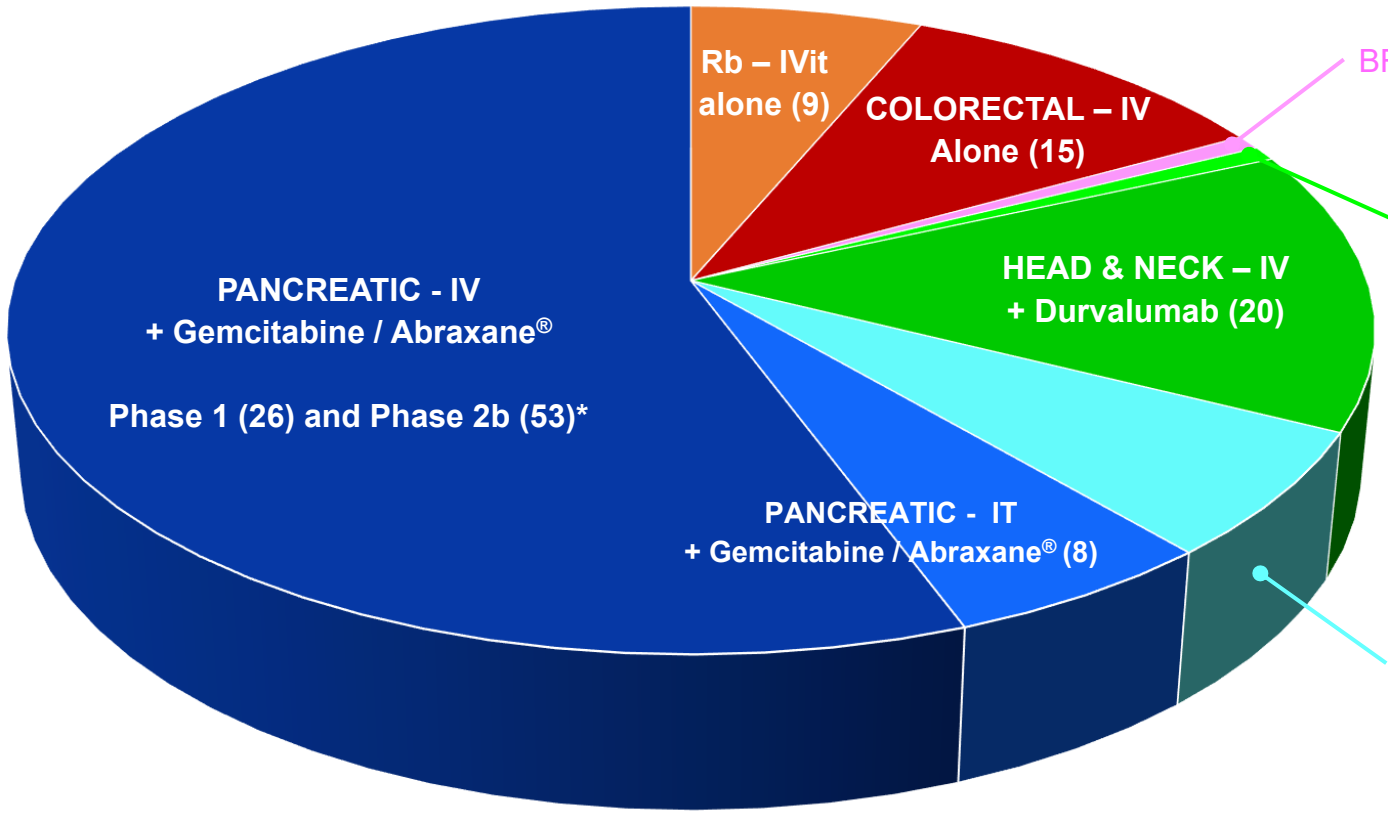
[1]At 26Nov2024. [2]Approximately $7x10^{11}$ $TCID_{50}$. References describing the different OV product candidates are provided in the appendix; information is also available on each company's website and clinicaltrials.gov

VCN-01 EXTENSIVE CLINICAL PROGRAM

142 patients treated with VCN-01 to date in multiple indications and combinations



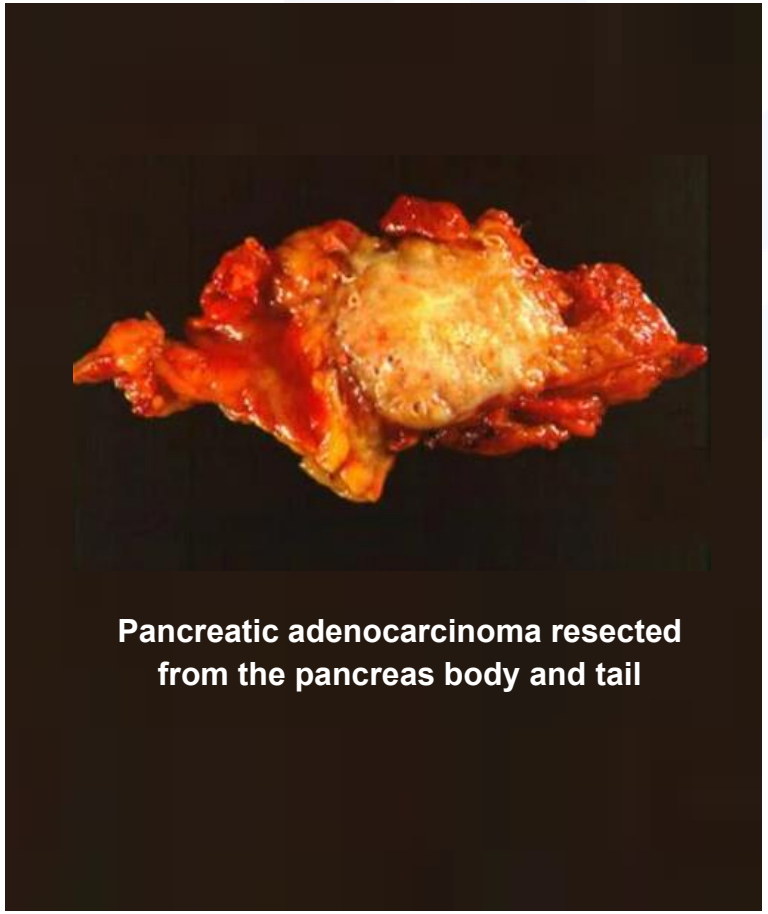
(Number of VCN-01 Patients Treated in Parentheses)

*On-going study. Abraxane® - nab-paclitaxel. Durvalumab (IMFINZI®, AstraZeneca) is an anti-PD-L1 mAb immune checkpoint inhibitor. huCART-meso are autologous T cells engineered to express an extracellular single chain variable fragment (scFv) with mesothelin specificity. IT - intratumoral. IV - intravenous. IVit - intravitreal. Rb - retinoblastoma. See Appendix for study registry numbers and publications.

VCN-01 LEAD INDICATION PANCREATIC CANCER

Highly fatal cancer protected by dense tumor stroma

- Orphan disease with the highest mortality of all solid tumors
  - Median survival 8-11 months for metastatic disease[1,2]
  - USA est. 66,440 new cases and 51,750 deaths in 2024[3]
- Hyaluronic acid in stroma is associated with reduced treatment efficacy and poor prognosis[4]
  - VCN-01 designed to degrade hyaluronic acid
- Incidence is growing worldwide
  - Est. treatment market ~$2.5B (2022) ~$7.0B (2030)[5]



Pancreatic adenocarcinoma resected from the pancreas body and tail

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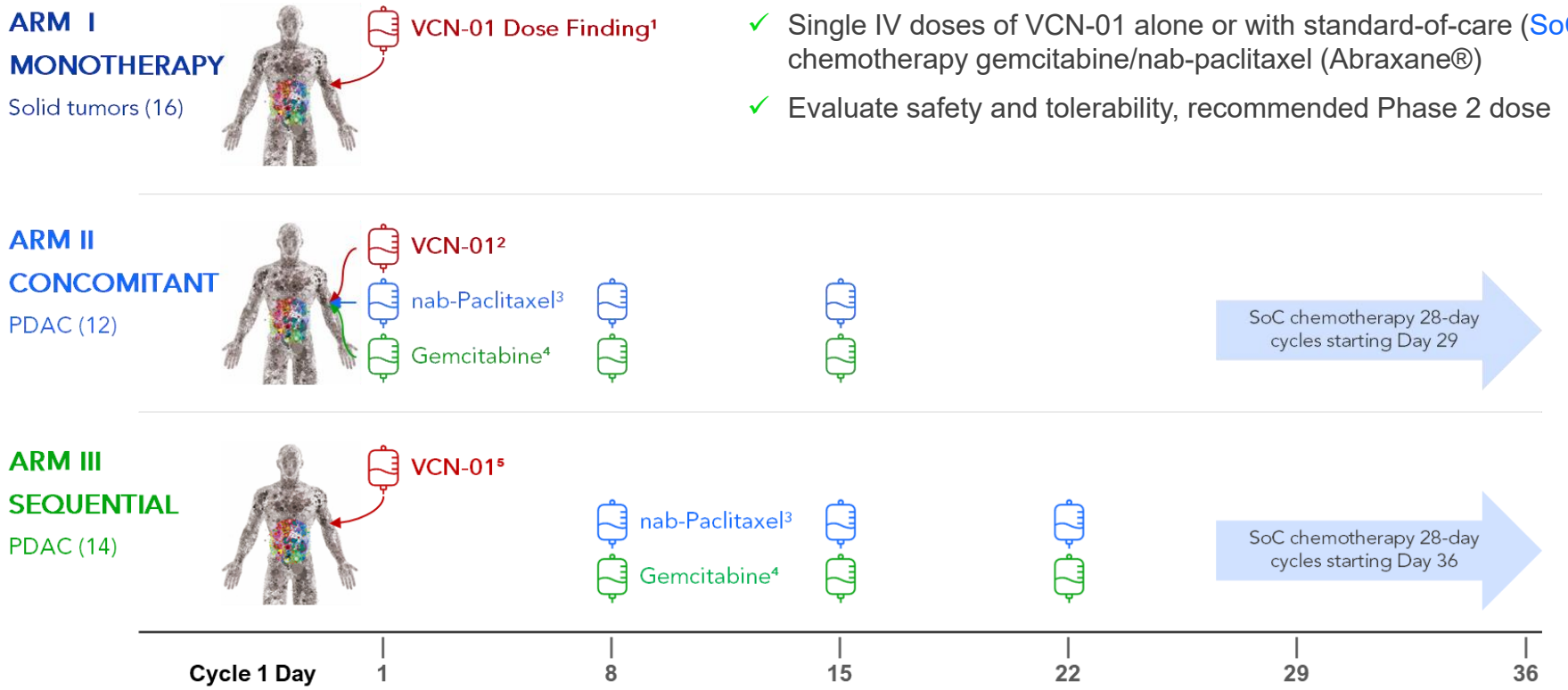
[1]Michael (2019) BMC Palliat Care 18:13, Bengtsson (2020) Sci Rep 10:16425, Carioli (2021) Ann Oncol 32:478, ASCO Pancreatic Cancer Statistics. [2]SEER Cancer Stat Facts: Pancreatic Cancer website. [3]American Cancer Society. Cancer Facts & Figures 2024. Atlanta: American Cancer Society; 2024. [4]Tahkola (2021) Sci Rep 11:12216, Placencio-Hickok (2022) Pancreatology 22:92. [5]Data Bridge Market Research website.

VCN-01 DOSE REGIMEN ESTABLISHED IN PHASE 1

Multicenter, open-label, dose escalation study (NCT02045602)



- ✓ Single IV doses of VCN-01 alone or with standard-of-care (SoC) chemotherapy gemcitabine/nab-paclitaxel (Abraxane®)
- ✓ Evaluate safety and tolerability, recommended Phase 2 dose

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¹Single dose of VCN-01 (1x10¹¹ to 1x10¹³ vp/dose) administered by 10 min IV infusion. ²VCN-01 doses 3.3x10¹² vp (n=6) and 1x10¹³ vp (6). ³nab-Paclitaxel (Abraxane®; 30 min infusion) administered at least 4 hours after VCN-01. ⁴Gemcitabine (30 min infusion) administered immediately after Abraxane® infusion. ⁵VCN-01 doses 3.3x10¹² vp (8) 1x10¹³ vp (6). Garcia-Carbonero (2022) J Immunother Cancer 10:e003255.

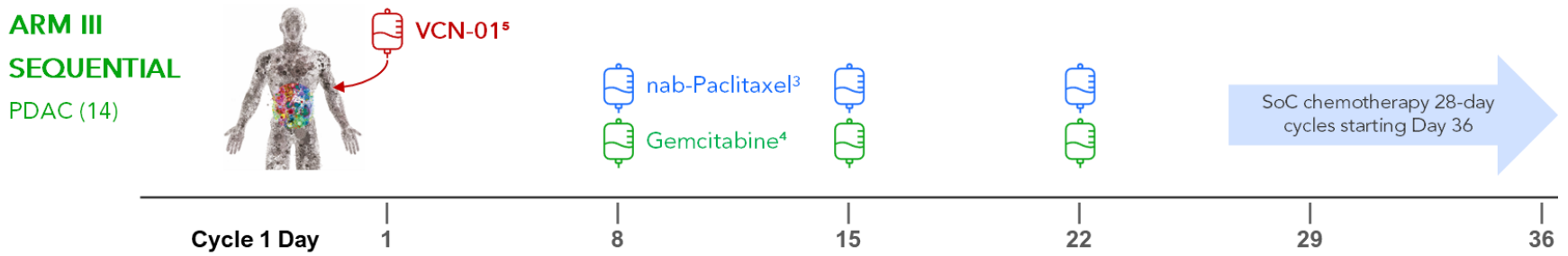
VCN-01 FAVORABLE OUTCOMES IN PHASE 1 TRIAL

Multicenter, open-label, dose escalation study (NCT02045602)

OUTCOME	VCN-01 DOSE, virus particles (n)[1]			SoC ALONE[2]
Sequential Regimen	$3.3x10^{12}$ (6)	$1.0x10^{13}$ (6)	Combined (12)	Phase 3 (431)
Responders, %	16.7%	**83.3%**	50.0%	22.9%
Median OS, months	13.1	**20.8**	13.5	8.5
Median PFS, months	9.9	6.3	6.7	5.5
Survival ≥12 months	.	.	67%	35%

KOLs advise that Hazard Ratio <0.7 is a significant patient outcome

RELATED AEs IN ≥1 PATIENT[1]	CTCAE SEVERITY	
VCN-01 Combined, Sequential Regimen	Grade 1-2	Grade ≥3
Pyrexia/Influenza-like Illness	**12 (85.7%)**	-
Nausea	3 (21.4%)	-
Vomiting	3 (21.4%)	-
Asthenia/Fatigue	3 (21.4%)	-
Transaminase increases (ALT, AST)	2 (14.3%)	2 (14.3%)
Thrombocytopenia	2 (14.3%)	-

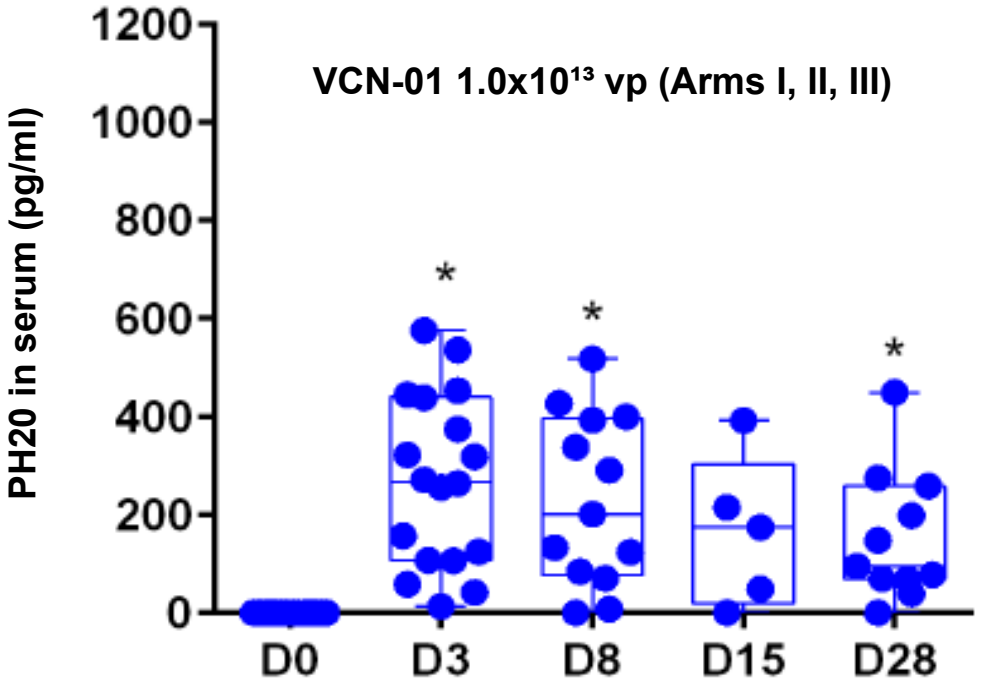


[1]Single dose of VCN-01 ($1x10^{11}$ to $1x10^{13}$ vp/dose) administered by 10 min IV infusion. [2]VCN-01 doses $3.3x10^{12}$ vp (n=6) and $1x10^{13}$ vp (6). [3]nab-Paclitaxel (Abraxane®; 30 min infusion) administered at least 4 hours after VCN-01. [4]Gemcitabine (30 min infusion) administered immediately after Abraxane® infusion. [5]VCN-01 doses $3.3x10^{12}$ vp (8) $1x10^{13}$ vp (6). Garcia-Carbonero (2022) J Immunother Cancer 10:e003255.

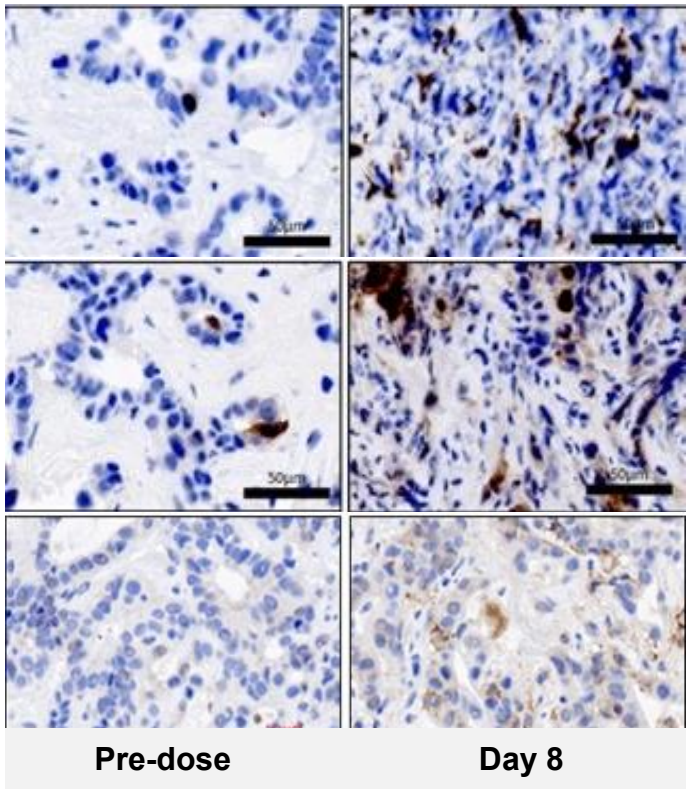
CLINICAL DATA SUPPORT VCN-01 MODE-OF-ACTION

Remodels the tumor matrix and turns “cold” tumors “hot”

Persistent replication: PH20 levels in patient sera indicate sustained VCN-01 activity in tumors



Immune markers upregulated in biopsies of **hepatic metastases**



CD8⁺ lymphocytes

IDO upregulation

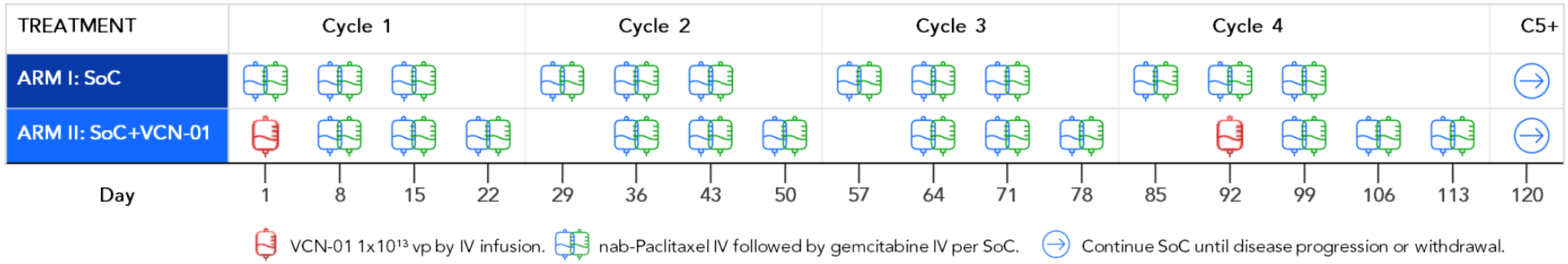
PD-L1 upregulation

IDO indoleamine 2,3-dioxygenase, PD-L1 programmed death-ligand 1 and CD8⁺ lymphocyte infiltration measured by immunohistochemistry. PH20 (hyaluronidase) levels measured using an ELISA assay. Garcia-Carbonero (2022) J Immunother Cancer 10:e003255 [NCT02045602].

VIRAGE PHASE 2B CLINICAL TRIAL in PANCREATIC CANCER

Multicenter, open-label, randomized, controlled trial (NCT05673811)

- Evaluating first-line treatment of patients with metastatic pancreatic ductal adenocarcinoma (PDAC)
  - Randomized 1:1 to receive gemcitabine/nab-paclitaxel SoC or up to two doses of VCN-01 plus SoC
  - Primary endpoints overall survival, VCN-01 safety and tolerability
  - Secondary endpoints include response rates, progression free survival, landmark survival
- Achieved target of 92 patients enrolled (46 in each arm) at sites in Spain and the USA
  - Following patients for survival
  - Anticipate top-line data late Q1 - early Q2 2024 (contingent on patient survival)



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SoC standard of care

VIRAGE PHASE 2 CLINICAL TRIAL DIFFERENTIATORS

- ✓ First-line treatment provides best opportunity to observe potential effect
- ✓ Direct comparison with SoC chemotherapy is the most rigorous control
- ✓ Repeated dosing of VCN-01 may improve treatment outcomes
- ✓ Open label provides real-time opportunity to review emerging VCN-01 treatment effects
- ✓ Orphan Drug Designation to facilitate regulatory interactions and provide market exclusivity
- ✓ Fast Track Designation for more frequent communication with FDA and eligibility for Accelerated Approval and Priority Review

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[1]Orphan Drug Designation has been obtained in the USA and Europe

ACHIEVEMENTS AND PROJECTED MILESTONES

Q3 2024

- **VCN-01 PDAC**
  - Ph2 enrollment achieved ✓
  - Spanish Government Public-Private Loan-Grant ✓
  - Meeting with AEMPS *potential pivotal trial design*
- **VCN-01 RETINOBLASTOMA**
  - RPDD granted ✓
- **SYN-004 aGVHD**
  - Cohort 2 DSMC Outcomes ✓

Q4 2024

- **VCN-01 PDAC**
  - Type D meeting with FDA ✓ *potential pivotal trial design*
  - Initiate manufacturing process development for commercial scale
- **VCN-01 RETINOBLASTOMA**
  - ODD from EMA ✓
- **VCN-01 + CAR-T**
  - U. Penn ASGCT poster ✓

Q1-Q2 2025

- **VCN-01 PDAC**
  - EMA Scientific Advice potential pivotal trial design
  - VIRAGE top-line data *contingent on patient survival*
- **VCN-01 RETINOBLASTOMA**
  - Finalize Phase 2 study design[1]
- **VCN OV DISCOVERY**
  - VCN-12 candidate selection[2]

Q3-Q4 2025

- **VCN-01 PDAC**
  - Initiate Phase 3 trial *if regulatory agreement*[1]
  - Establish feasibility of commercial scale VCN-01 manufacture
- **THERICEL**
  - Commercial availability of proprietary suspension cell line for manufacturing viral products

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[1]Contingent on Theriva obtaining required funding for a clinical trial and subject to regulatory agreement. [2]VCN-12 is an armed version of VCN-11 designed to express an additional functional payload (VCN-11 is the first clinical candidate using the Albumin Binding Domain™ technology). ISS investigator sponsored Phase 1 study. AEMPS Agencia Española de Medicamentos y Productos Sanitarios. ASGCT American Society of Gene and Cell Therapy. EMA European Medicines Agency. ODD Orphan Drug Designation. RPDD rare pediatric disease designation. SIOP International Society of Paediatric Oncology

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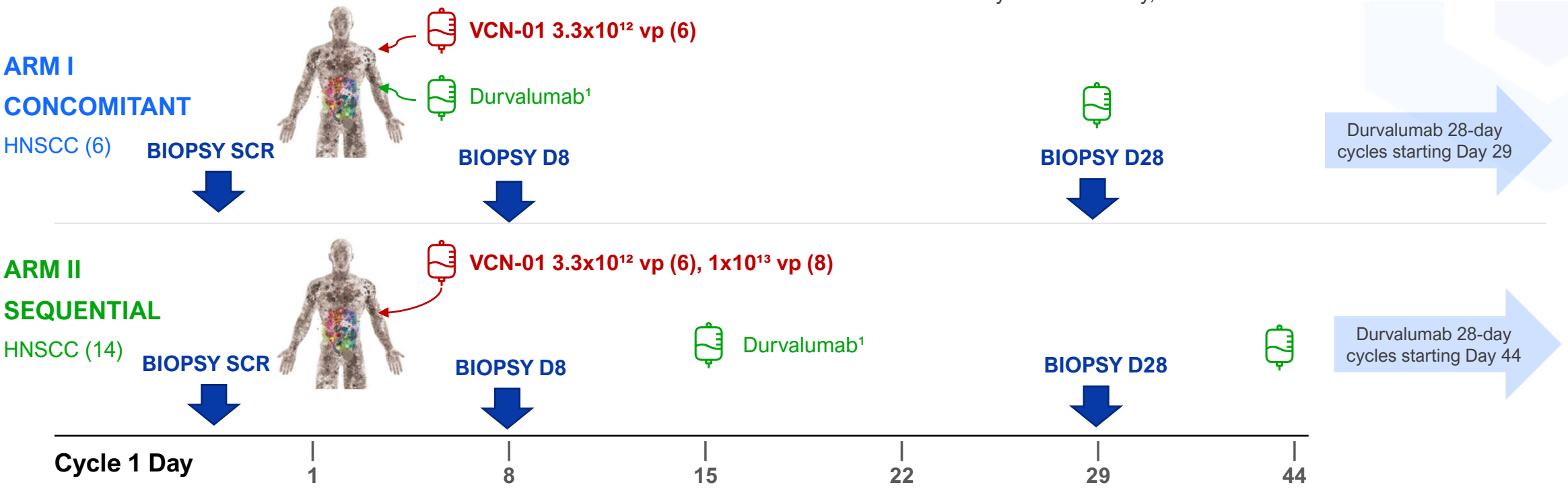
VCN-01 IN HEAD & NECK CANCER

VCN-01 IV + ANTI-PD-L1 PHASE 1 TRIAL in HNSCC

Multicenter, open-label, dose escalation study (NCT03799744)

- ✓ Single IV doses of VCN-01 combined with anti-PD-L1
- ✓ Patients with metastatic squamous cell carcinoma of the head & neck previously **REFRACTORY** to anti-PD(L)1 treatment (R/M HNSCC)
- ✓ Evaluate safety and tolerability, recommended Phase 2 dose



[1]Durvalumab 1500 mg (60 min infusion) administered at least 4 hours after VCN-01. HNSCC head and neck squamous cell carcinoma.
Jové M (2023) Ann Oncol 34:S589–S590.

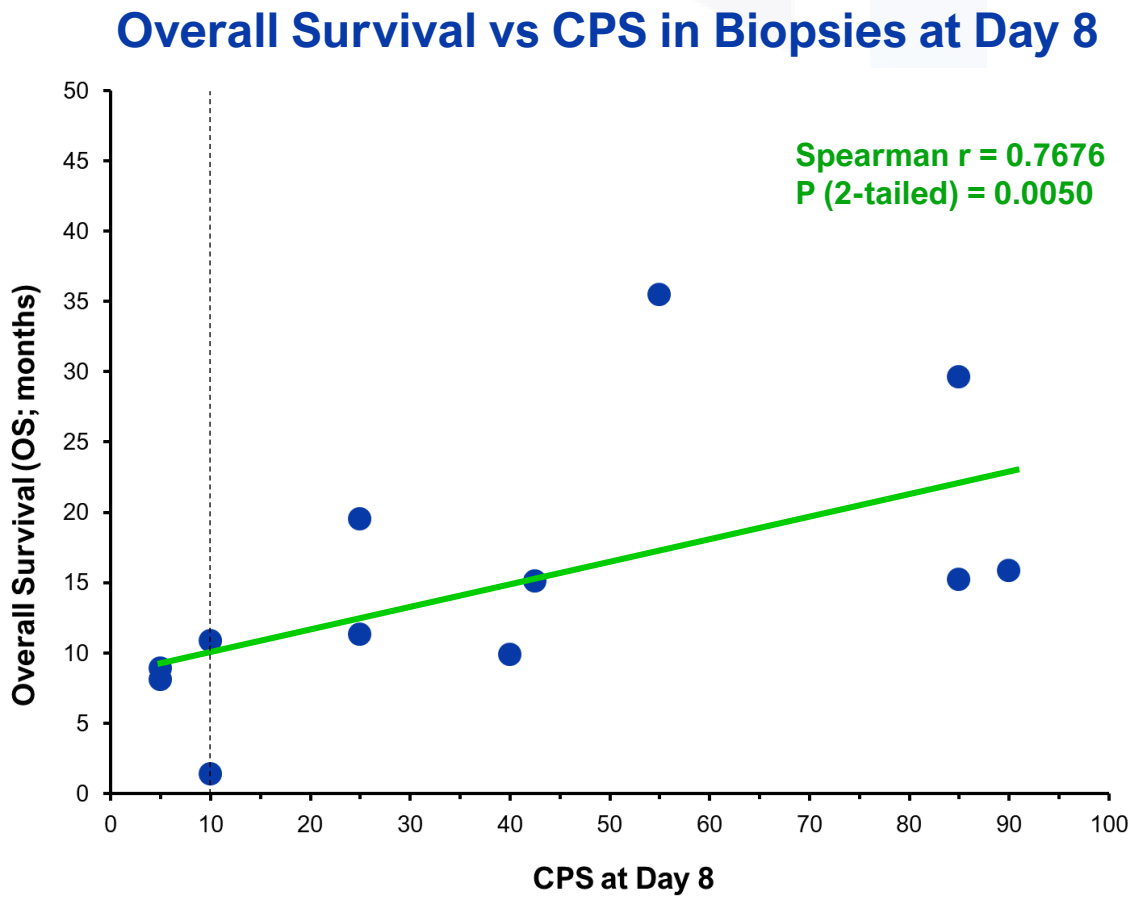
EXTENDED SURVIVAL with VCN-01+DURVALUMAB

Survival correlated with PD-L1 upregulation after VCN-01 treatment

- Higher than expected survival (OS) despite previous anti-PD(L)1 failure

Regimen	Median OS (95% CI), mos	
	$3.3x10^{12}$ vp	$1.0x10^{13}$ vp
Concomitant	10.4 (8.9-NE)	..
Sequential	15.5 (15.1-NE)	17.3 (11.3-NE)

- No correlation of survival with baseline tumor PD-L1 expression (CPS) BUT significant correlation of survival with CPS 8-days after VCN-01 treatment



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ESMO Congress 2023 Poster 937P: Survival Outcomes in Phase I Trial Combining VCN-01 and Durvalumab (MEDI4736) in Subjects with Recurrent/Metastatic Head and Neck Squamous Cell Carcinoma Refractory to Previous Immunotherapy Treatment. Jové M (2023) Ann Oncol 34:S589

VCN-01 FINDINGS in R/M HNSCC

Data support VCN-01 MOA and immune enhancing effects

- VCN-01 has an acceptable adverse event profile when administered prior to durvalumab (Imfinzi®)
- VCN-01 reaches tumors, has sustained replication and PH20 expression
- VCN-01 treatment led to downregulation of tumor matrix genes and increased levels of immune markers in tumor biopsies (CD8, PD-L1, IDO)
- VCN-01-treated patients showed increased response to subsequent chemotherapy treatment lines after progressing on this trial

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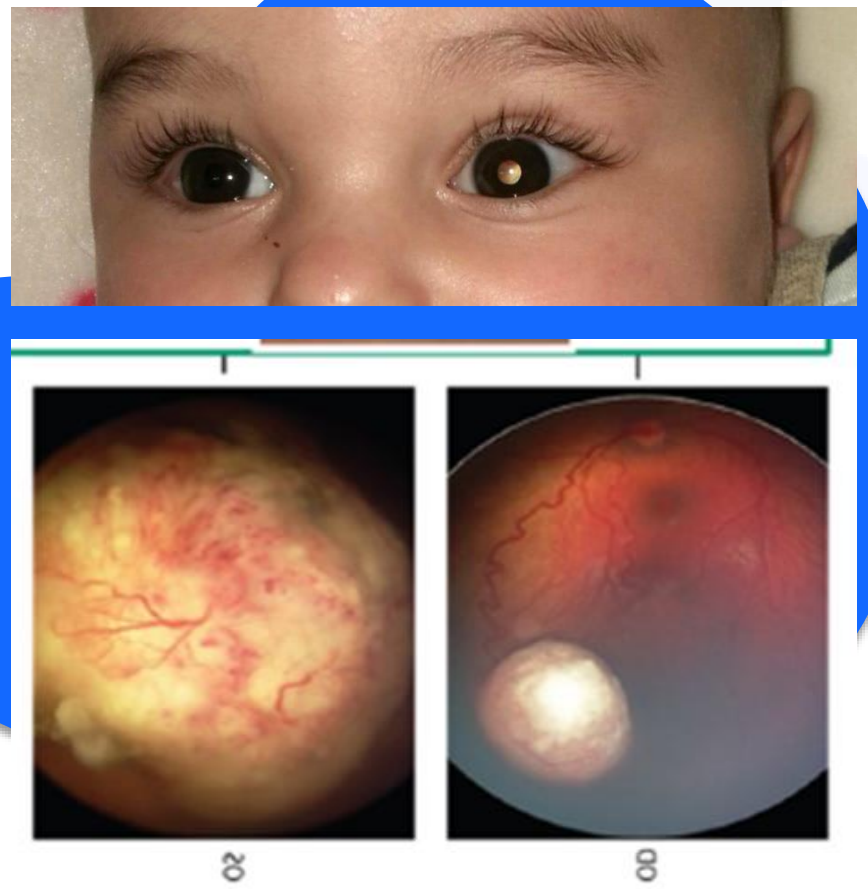
ESMO Congress 2022 Poster 1231P: Phase I Study to Evaluate the Safety, Tolerability, and Efficacy of VCN-01 in Combination With Durvalumab (MEDI4736) in Subjects With Recurrent/ Metastatic Squamous Cell Carcinoma of the Head and Neck (R/M HNSCC). Jove M (2022) Ann Oncol 33:S1112.
IDO Indoleamine-2,3-dioxygenase.

VCN-01 IN RETINOBLASTOMA

RETINOBLASTOMA, A RARE PEDIATRIC MALIGNANCY

- Retinoblastoma (Rb) is an orphan indication that accounts for ~2-3% of all childhood cancers[1]
- 200-300 cases each year in the USA, EU[2-4]
- VCN-01 selectivity enables development as an intravitreal treatment for Rb patients
- VCN-01 could be used in combination with chemotherapy to potentially improve outcomes
- VCN-01 could be used as a rescue therapy for patients who fail standard therapy



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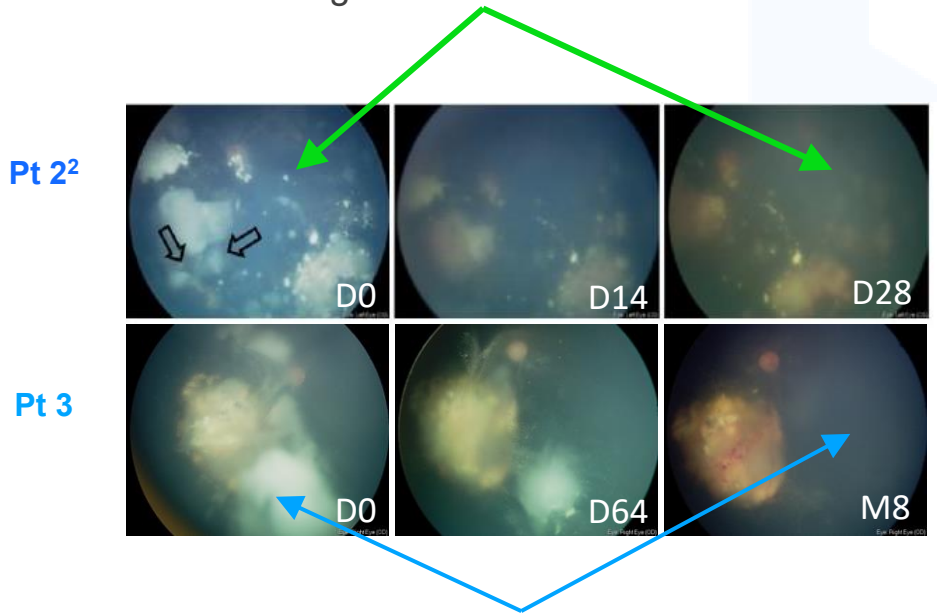
[1]https://www.cancer.org/cancer/retinoblastoma/about/key-statistics.html. [2]Stacey (2021) Ophthalmology 128:1369. [3]One Retinoblastoma World Map https://map.1rbw.org/. [4]For additional details and references see Appendix. IMAGE: Courtesy of Hospital Sant Joan de Déu, Barcelona

VCN-01 IN RETINOBLASTOMA

- Single center, open-label, dose escalation study of intravitreal (IVit) VCN-01[1-3]
  - Children aged 1-12 years (n=9)
  - Retinoblastoma that is recurrent or refractory to chemotherapy and for whom enucleation is the best treatment option
  - VCN-01 doses of $2.0x10^9$ vp per eye (n=1) or $2.0x10^{10}$ vp per eye (n=8) on days 1 and 15
- Promising antitumor activity and appropriate adverse event profile and tolerability at RP2D
  - Reduction of vitreous seeds in 4 patients of 9 evaluable patients
  - Enucleation avoided in 3 patients; low VCN-01 dose and/or damage from prior chemotherapy meant the eye could not be saved in 6 patients
- Earlier VCN-01 intervention anticipated to have better outcomes

Promising Results in Patients Treated with High Dose VCN-01

Reduced number and size of tumor vitreous seeds following VCN-01 administration[2]



Complete tumor regression[3]

[1]NCT03284268. [2]Pascual Pasto (2019) Sci Transl Med 11:eaat9321. [3]Data presented at International Oncolytic Virus Conference IOVC2021, 07 November 2021, Sedona, AZ. Link to IOVC2021 slide deck provided in Appendix. RP2D recommended phase 2 dose. vp virus particles.

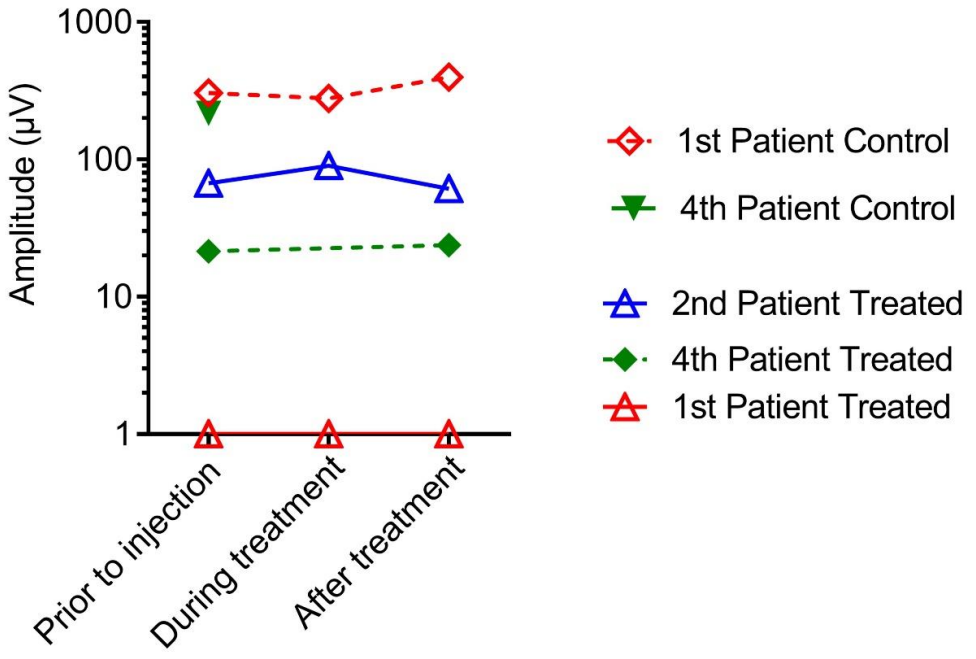
INTERIM ADVERSE EVENT DATA FOR INTRAVITREAL VCN-01

Two Intravitreal VCN-01 Doses of $2.0x10^9$ or $2.0x10^{10}$ vp per eye[1]

Adverse Reaction	Pts	All Grades		Grade ≥3	
CTCAE grade	N	n	%	n	%
Uveitis	6	2	33%	2	33%
Eye oedema	6	1	17%	0	0%
Conjunctival hyperemia	6	1	17%	0	0%
Eye inflammation	6	1	17%	0	0%

- VCN-01 was reasonably well tolerated after intravitreal administration[2], although some turbidity and vitritis associated with intravitreal inflammation was observed
- Intravitreal inflammation was managed with local and systemic administration of anti-inflammatory drugs
- VCN-01 did not appear to change retinal function (electroretinographic signaling)
- VCN-01 does not replicate in healthy retinal tissue of patients with either somatic or germline Rb mutation[3]

Stable Electroretinographic Signals



[1]NCT03284268. [2]Intravitreal VCN-01 doses of $2.0x10^9$ virus particles (vp) per eye (Patient 1) or $2.0x10^{10}$ vp per eye (Patients 2-4) administered on days 1 and 15. [3]Pascual Pasto (2019) Sci Transl Med 11:eaat9321. Data presented at International Oncolytic Virus Conference IOVC2021, 07 November 2021, Sedona, AZ.

VCN-01 DEVELOPMENT IN RETINOBLASTOMA

- Phase 1 ISS Completed H1 2024
  - Initial data demonstrate acceptable adverse event profile and one durable complete response
- Developing a clinical protocol for an open-label, multinational study
  - Retinoblastoma patients with vitreous seeds
  - IVit VCN-01 in combination with chemotherapy (no defined SoC)
  - PI Dr. Guillermo Chantada, MD PhD[1]
- Status
  - US Orphan Drug Designation (EU application in process)
  - Pre-IND meeting with FDA completed Q4 2023
  - Rare Pediatric Disease Designation (potential eligibility for Priority Review Voucher)

Theriva BIOLOGICS

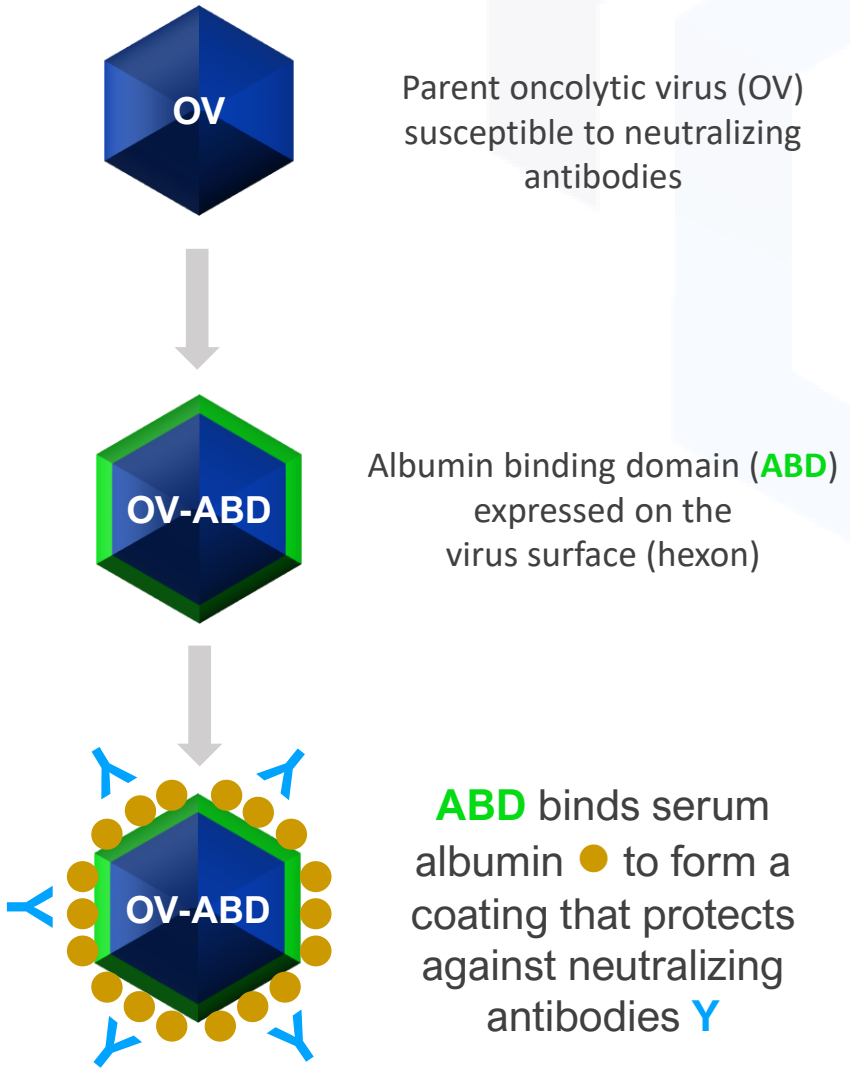
[1]Principal Researcher, Associate Physician, Hospital Sant Joan de Déu, Barcelona, Spain; Scientific Director, Pediatric Hemato-Oncology Service of the Hospital Universitario Austral, Argentina

Theriva BIOLOGICS

VCN-X NEXT GENERATION OV DISCOVERY PLATFORM

ALBUMIN SHIELD™ to ENHANCE OV SYSTEMIC DELIVERY

- Albumin Shield technology protects OVs as they travel to tumors after systemic administration[1,2]
- Albumin Shield modified OVs bind albumin in the patient's blood to form a protective coating
- Albumin Shield genetic modification allows parent and progeny virus to be albumin coated
- Albumin Shield may enable multiple IV administrations for hard-to-treat patients
- Albumin Shield first candidate VCN-11 is being prepared for a potential Phase 1 clinical trial



Theriva BIOLOGICS

[1]Rojas (2016) J Control Rel 237:78; ABD binds mouse and human serum albumin, but not bovine; [2]Mato-Berciano (2021) J Control Rel 332:517.

THERIVA OV PIPELINE DISCOVERY AND DEVELOPMENT

Advancing founders' decade of world leading OV innovation

Common Features

Clinically-tested Adenovirus Expressing PH20 Hyaluronidase to Degrade Stroma

+

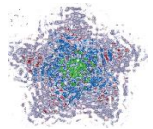
Albumin Shield™ To Prevent Neutralization by anti-viral Antibodies and Facilitate IV Multidosing

+

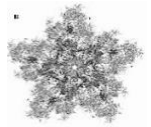
Unique Multifunctional Proteins to Turn Cold Tumors Hot and Enhance Anti-tumor Immune Response

Product Specific Features

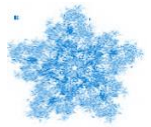
VCN-11 Hyaluronidase alone



VCN-12 Hyaluronidase + Toxins



VCN-13 Fusion Hyaluronidase + scPD-L1



VCN-XX Hyaluronidase + other payloads

Theriva BIOLOGICS

APPENDICES

INTELLECTUAL PROPERTY

Hyaluronidase OV

VCN-01, VCN-11

Composition of Matter (exp 2030)

Methods of Use and Novel Formulations (examination)

Use in Rb (exp 2036)

ODD EU (PDAC)

ODD US (PDAC & Rb)

Albumin Shield™

VCN-11, Discovery

Composition of Matter (exp 2034)

Methods of Use and Novel Formulations (examination)

Oral β-Lactamase

SYN-004, -006, -007

Composition of Matter (exp 2031-5)

Methods of Use and Novel Formulations (exp 2035-6)

Oral IAP

SYN-020

Manufacturing Know-how (Trade Secret)

Methods of Use and Novel Formulations (applications filed)

Option to additional IP from MGH

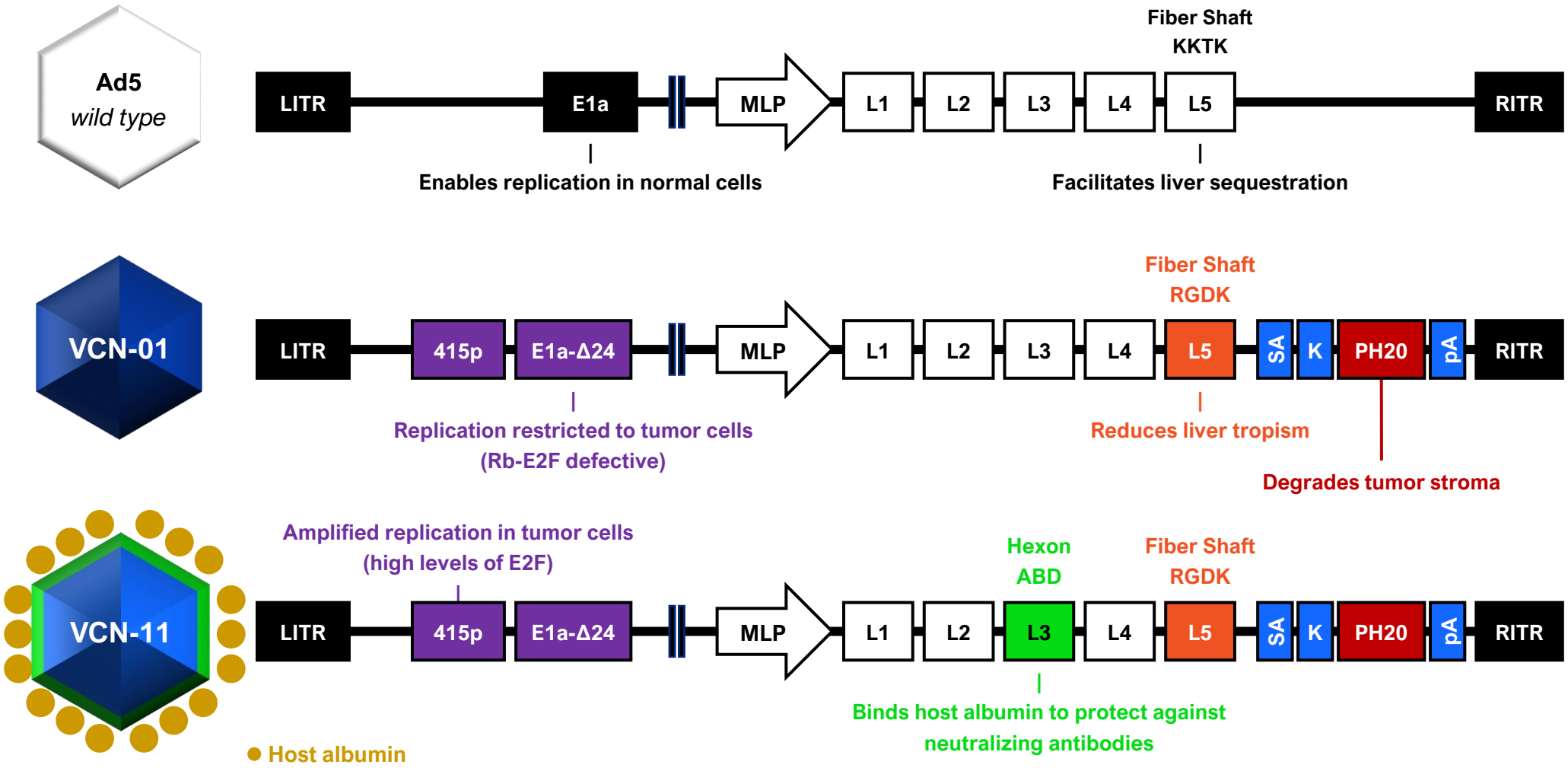
Theriva BIOLOGICS

ODD Orphan Drug Designation provides 7 years market exclusivity in US and 10 years in the EU. OV oncolytic virus. PDAC pancreatic ductal adenocarcinoma. Rb retinoblastoma.

Theriva BIOLOGICS

VCN-01 IN PANCREATIC CANCER

VCN ONCOLYTIC VIRUS GENETIC MODIFICATIONS



ABD albumin binding domain (streptococcal protein G)[1]

Ad5 Adenovirus type 5

E1a-Δ24 deletion of 24 base pairs within the E1a promoter; further modified by insertion of 8 extra E2F binding sites and one Sp1-binding site at nucleotide site 415 (**415p**)

MLP major late promoter[2]

PH20 soluble human testicular hyaluronidase[3]

KKTK Lys-Lys-Thr-Lys putative HSPG binding domain on fiber shaft

RGDK Arg-Gly-Asp-Lys inserted in place of KKTK on fiber shaft

VCN-12 VCN-11 armed with additional therapeutic transgene

Theriva BIOLOGICS

[1]Since this is a transgene, progeny virus will also be albumin coated. [2]MLP control means transgenes will only be expressed after replication, which occurs selectively in tumor cells. Transgene expression (PH20 in blood) can be a biomarker for viral replication in the tumor. [3]PH20 cassette inserted downstream of the fiber gene contains a splice acceptor (SA), a kozak sequence (K) and a polyadenylation stop sequence (pA)

EXTENSIVE VCN-01 PHASE 1 CLINICAL EXPERIENCE

89 Patients Treated in Diverse Cancer Indications

Location	Phase	Indication	Co-therapy	Route	Status	Registry
Multicenter (ESP)	1	Part I: Solid tumor Part II, III: PDAC	Part I: None Parts II,III: Gemcitabine + nab-Paclitaxel	IV	Complete[1]	NCT02045602
Multicenter (ESP)	1	PDAC	Gemcitabine + nab-Paclitaxel	IT	Complete[2]	NCT02045589
Hospital Sant Joan de Déu, Barcelona	1	Retinoblastoma	None	IVit	Ongoing; partial data available	NCT03284268
Institut Català d'Oncologia (ICO)	1	HNSCC	Durvalumab	IV	Treatment complete; Initial data H2'22	NCT03799744
U. Leeds	1	Adult brain tumors	None	IV	Ongoing	ISRCTN 517624869
U. Pennsylvania	1	PDAC, Ovarian	huCART-meso[3]	IV	Ongoing	NCT05057715

Theriva BIOLOGICS

[1]Garcia-Carbonero (2022) J Immunother Cancer 10:e003255. [2]Bazan-Peregrino (2021) J Immunother Cancer 9:e003254. [3]huCART-meso are autologous T cells engineered to express an extracellular single chain variable fragment (scFv) with mesothelin specificity. HNSCC head and neck squamous cell carcinoma. IV intravenous. IT intratumoral. IVit intravitreal.

MOST COMMON IV VCN-01 RELATED AEs [NCT02045602]

ADVERSE EVENTS[1]	Part I (Alone, n=16)		Part II (Concomitant, 12)[2]		Part III (Sequential, 14)[3]	
	Grade 1-2	Grade ≥3	Grade 1-2	Grade ≥3*	Grade 1-2	Grade ≥3
Febrile neutropenia	-	-	-	2 (16.7%)	-	-
Neutropenia/Neutrophil count decreased	2 (12.5%)	-	1 (8.3%)	1 (8.3%)	-	-
Thrombocytopenia/Platelet count decreased	1 (6.3%)	1 (6.3%)	3 (25.0%)	4 (33.3%)	2 (14.3%)	-
Diarrhea	3 (18.8%)	-	1 (8.3%)	-	-	1 (7.1%)
Nausea	2 (12.5%)	-	3 (25.0%)	-	3 (21.4%)	-
Vomiting	3 (18.8%)	-	2 (16.7%)	-	3 (21.4%)	-
Asthenia/Fatigue	2 (12.5%)	-	5 (41.7%)	1 (8.3%)	3 (21.4%)	-
Pyrexia/Influenza-like Illness	**12 (75.0%)**	**1 (6.3%)**	**8 (66.7%)**	**-**	**12 (85.7%)**	**-**
Transaminase increases (ALT, AST)	2 (12.5%)	3 (18.8%)	1 (8.3%)	1 (8.3%)	2 (14.3%)	2 (14.3%)
Pancreatic enzyme increase (lipase, amylase)	1 (6.3%)	3 (18.8%)	-	-	-	-
Decreased appetite	3 (18.8%)	-	3 (25.0%)	-	-	-
Arthralgia	2 (12.5%)	-	-	-	-	-
Musculoskeletal pain	3 (18.8%)	-	4 (33.3%)	-	-	-
Dizziness	1 (6.3%)	-	1 (8.3%)	-	-	-
Headache	1 (6.3%)	-	1 (8.3%)	-	1 (7.1%)	-
Dyspnea	2 (12.5%)	-	-	-	-	-
Hypotension	2 (12.5%)	-	1 (8.3%)	-	-	-

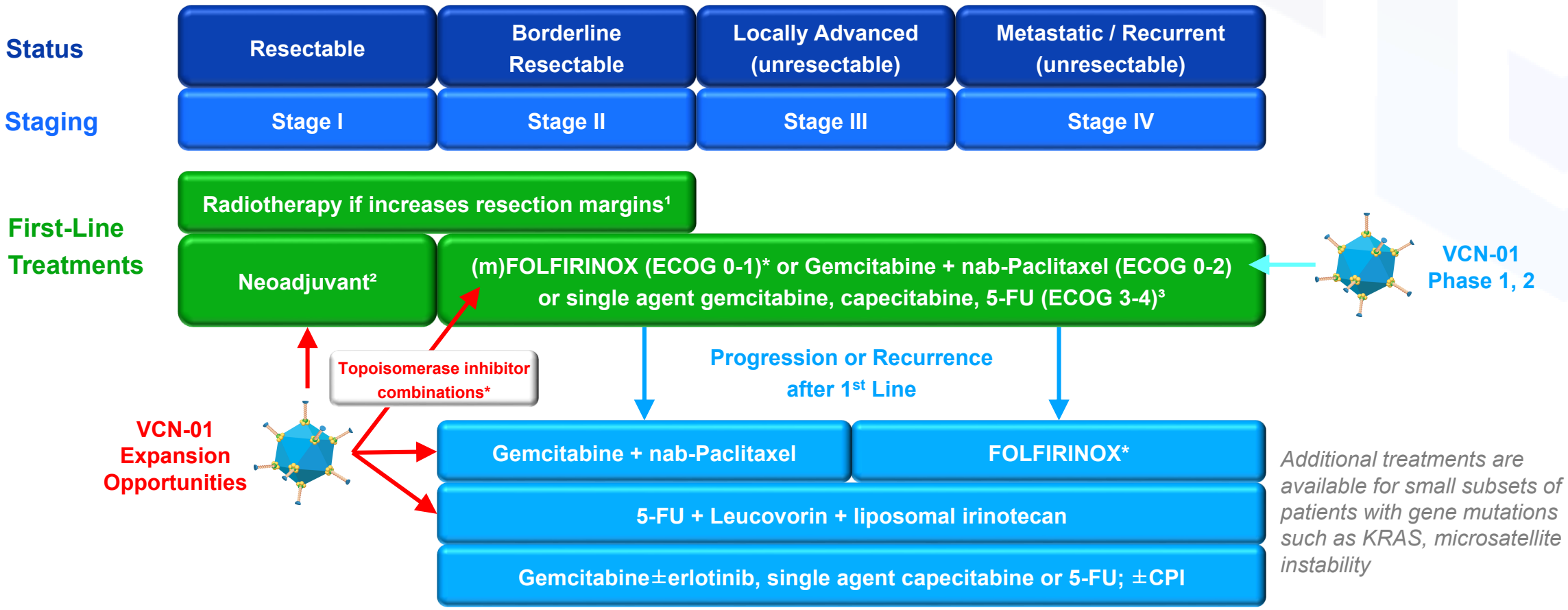
*Part II: one patient at the highest dose (1x10^{13} vp) died from a combination of thrombocytopenia (Grade 4) and enterocolitis (Grade 5)

Theriva BIOLOGICS

[1]Garcia-Carbonero (2022) J Immunother Cancer 10:e003255. [2]Concomitant IV VCN-01 3.3x10^{12} or 1.0x10^{13} vp/patient administered same day as first dose of SoC IV gemcitabine/nab-paclitaxel. [3]Sequential IV VCN-01 3.3x10^{12} or 1.0x10^{13} vp/patient administered 7-days prior to first dose of SoC.

EXPANSION OPPORTUNITIES for VCN-01 in PDAC

Alternate treatment lines and new chemotherapy combinations



¹Used in <20% of PDAC cases. ²Identical to first-line chemotherapy. ³Eastern Cooperative Oncology Group Performance Status.
Abbreviations: CPI checkpoint inhibitor. (m)FOLFIRINOX (modified) leucovorin+5-FU+irinotecan+oxaliplatin. nab-Paclitaxel nanoparticle albumin-bound paclitaxel. *NALIRIFOX leucovorin+ 5-FU+liposomal irinotecan+oxaliplatin regimen sNDA accepted by FDA June 2023 for first line metastatic PDAC.
Adapted from Tempero (2021) *J Natl Compr Canc Netw* **19**:439.

VCN-01 WITH GEMCITABINE/ NAB PACLITAXEL

Potential survival benefit compared to all first-line chemotherapy

COMPANY	THERIVA BIOLOGICS (Phase 1)		PDAC FIRST LINE CHEMOTHERAPY			
Virus	VCN-01	VCN-01		..	..	..
Dose	$3.3x10^{12}$ vp x1 $1x10^{13}$ vp x 1*	$1x10^{13}$ vp x 1*	..	..	..	..
Chemotherapy	Gemcitabine + Nab Paclitaxel	Gemcitabine + Nab Paclitaxel	Gemcitabine + Nab Paclitaxel		FOLFIRINOX	NALIRIFOX
No. Patients	12 (6/dose)	6	431	387	171	383
Response Rate, %	50% [21, 79]	**83% [36, 99.6]**	29% [25%, 34%]	36.2% [31.4, 41.2]	31.6% [24.7, 39.1]	41.8% [36.8, 46.9]
Progression Free Survival, mos	6.7 [4.5, 11.7]	6.3 [5.7, NE]	5.5 [4.5, 5.9]	5.6 [5.3, 5.8]	6.4 [5.5, 7.2]	7.4 [6.0, 7.7]
12-Mo. Survival, %	66.7%	**83.3%**	35%	39.5%	48.4%	45.6%
Overall Survival, mos	13.5 [7.1, 29.0]	**20.8 [12.2, NE]**	8.5 [7.9, 9.5]	9.2 [8.3, 10.6]	11.1 [9.0, 13.1]	11.1 [10.0, 12.1]
	Garcia-Carbonero JITC 10:e003255	Garcia-Carbonero JITC 10:e003255	Von Hoff NEJM 369:1691	Wainberg Lancet 402:1272	Conroy NEJM 364:1817	Wainberg Lancet 402:1272

Theriva BIOLOGICS

*Approximately $2.2x10^{11}$ $TCID_{50}$ and $7x10^{11}$ $TCID_{50}$ respectively.

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Theriva BIOLOGICS

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