



# Investor Presentation

September 2020

This presentation contains certain forward-looking statements relating to the company's business prospects and the development and commercialization of pelareorep, a first-in-class systemically administered immuno-oncology agent for solid tumors and heme malignancies, including statements regarding the company's belief as to the potential and mode of action of pelareorep as a cancer therapeutic; the design, aims and anticipated benefits of the company's current or pending clinical trials involving pelareorep; pelareorep's potential synergies with ICIs and expectations regarding the growth of the ICI market. These statements are based on management's current expectations and beliefs and are subject to a number of factors which involve known and unknown risks, delays, uncertainties and other factors not under the company's control which may cause actual results, performance or achievements of the company to be materially different from the results, performance or other expectations implied by these forward-looking statements.

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Clinical-stage biotechnology company developing **pelareorep**, an intravenously delivered immuno-oncolytic virus that promotes an inflamed tumor phenotype

Exchanges	Nasdaq: ONCY / TSX: ONC
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Market Cap.	\$67.5M
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Cash & Equivalents	CDN \$29.9M (USD \$22.5M) <i>Based on FX as of August 4, 2020</i>
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Shares Outstanding	41,656,998
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Fully Diluted	46,092,630
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Cash Runway	Q4 2021
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HQ	San Diego, CA, US Calgary, AB, Canada
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## Pelareorep: 1<sup>st</sup> in class intravenously delivered immuno-oncolytic virus

Ability to selectively replicate in cancerous cells and induce an immune response validated in multiple clinical studies

Demonstrated synergies with immune checkpoint inhibitors

Safe and well tolerated: tested in over 1,000 patients

## Strong lead program in breast cancer with two ongoing Phase 2 studies

Supported by compelling clinical data from a randomized phase 2 study showing a near doubling of OS with pelareorep treatment

BRACELET-1 and IRENE trials evaluate pelareorep-based therapies in HR+/HER2- and TNBC breast cancer, respectively

T cell clonality identified as a biomarker of pelareorep response

## Diversified pipeline with programs in GI cancers and hematologic tumors

GI cancer: Ongoing Phase 2 trial in pancreatic cancer; T cell clonality and CEACAM6 expression identified as biomarkers of pelareorep response and resistance

Multiple myeloma: Ongoing phase 1 trials evaluating pelareorep in combination with carfilzomib alone and in combination with carfilzomib + nivolumab

## Synergy with ICI's: multi-billion-dollar market opportunity

ICI market is expected to exceed \$25B by 2022<sup>1</sup>

As few as 1 in 5 patients respond to ICI therapy

Robust clinical and pre-clinical data demonstrate pelareorep's potential to increase the proportion of patients responding to ICIs

# Experienced Leadership and Advisory Board

Extensive knowledge of immuno-oncology | Public company experience | Strong business development and commercialization expertise

## MANAGEMENT

### **Matt Coffey, PhD, MBA**

Co-founder, Director,  
President & CEO

### **Thomas Heineman, MD, PhD**

Global Head of Clinical Development and  
Operations  
Denovo, Genocea, Halozyme, GSK

### **Kirk Look, CA**

Chief Financial Officer  
EY LLP

### **Andrew de Guttadauro**

Global Head of Business Development  
Amgen, Biogen, Takeda

### **Allison Hagerman, PEng, PMP**

VP of Product Development  
Visionary Biomedical

## NON-EXECUTIVE DIRECTORS

### **Wayne Pisano, MBA**

Chair of the Board, Oncolytics  
Former President, Sanofi Pasteur

### **Leonard Kruimer, MBA**

Chairman, Bioinvent & Director, Zealand Pharma  
Former CFO, Crucell

### **Angela Holtham, MBA, ICD.D**

Nabisco  
Hospital for Sick Children

### **William G. Rice, PhD**

President & CEO, Aptose Biosciences  
Former President, CEO & Director of Achillion

### **Bernd R. Seizinger, MD, PhD**

Former President & CEO  
of GPC Biotech Oncology Drug Discovery, BMS

### **Deborah M. Brown, BSc, MBA**

Former President, EMD Serono Canada  
CCTG

## SCIENTIFIC ADVISORY BOARD

### **Dr. Martine Piccart, MD, PhD**

Professor of Oncology, Université  
Libre de Bruxelles  
BCRF Scientific Advisory Board  
Co-Founder of Breast international Group (BIG)

### **Dr. Aleix Prat, MD, PhD**

Head, Medical Oncology Department,  
Hospital Clinic of Barcelona  
SOLTI - Breast Cancer Research Group

### **Dr. Padmanee Sharma, MD, PhD**

Professor, Department of  
Genitourinary Medical Oncology  
MD Anderson Cancer Center  
KITE, Amgen & BMS IO Network

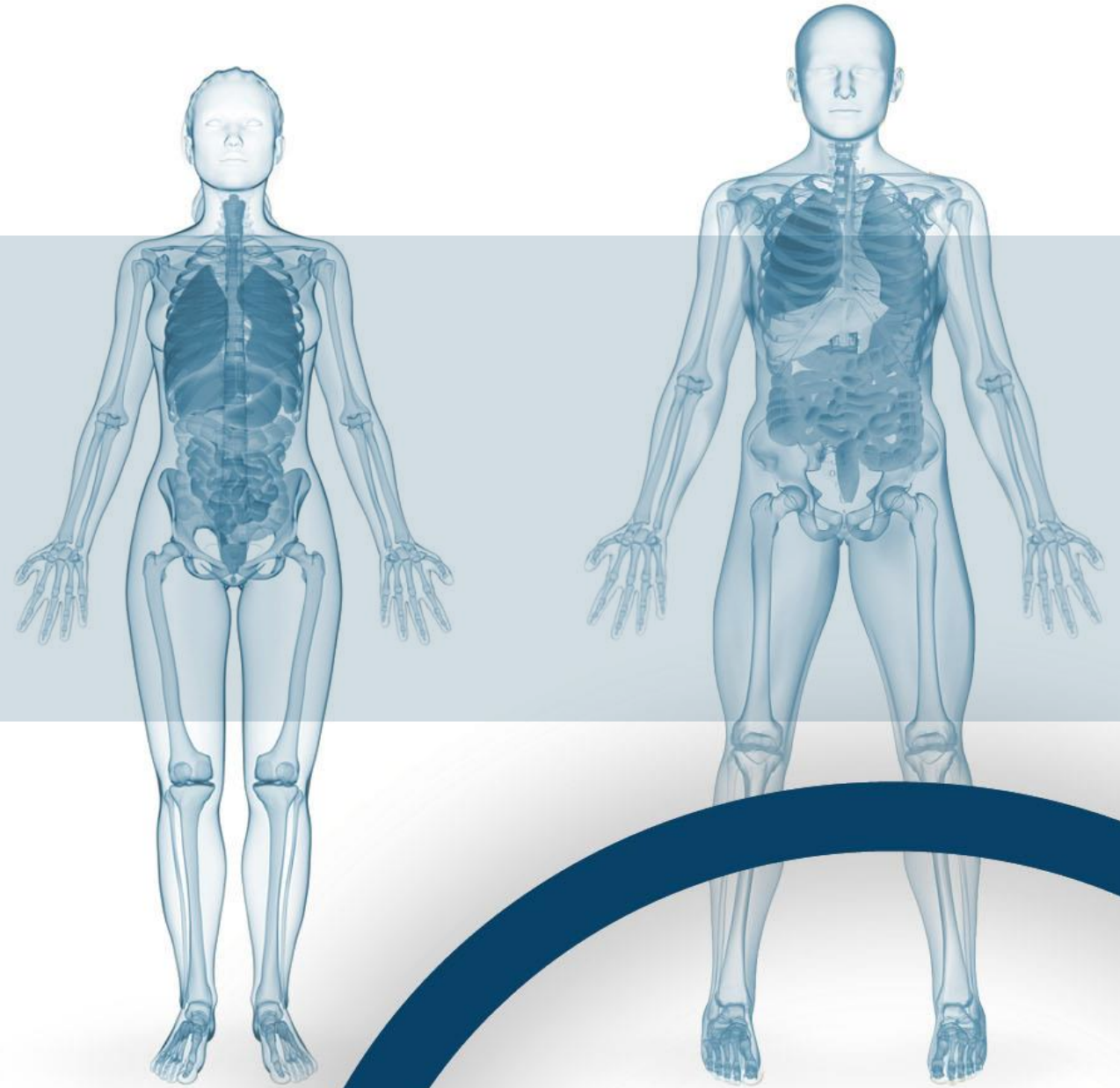


# Ongoing Pelareorep Clinical Studies

Programs	Combination	Indication	Preclinical	Phase 1	Phase 2	Phase 3	Milestone
<b>Breast Cancer</b>							
BRACELET-1		mBC (HR+/HER2-)	[Progress bar]				FPI Achieved Q2 2020
AWARE-1		Early stage BC	Window of opportunity study				Interim Data Achieved Q2 2020
IRENE	Retifanlimab*	TNBC	[Progress bar]				FPI Achieved Q3 2020
<b>Gastro-Intestinal Cancer</b>							
NU 18101		Pancreatic Cancer	[Progress bar]				H1 2021
<b>Multiple Myeloma</b>							
NCI-9603		R/R Multiple Myeloma	[Progress bar]				Interim Data Achieved Q2 2020
WINSHIP 4398-18		R/R Multiple Myeloma	[Progress bar]				H1 2021

# Pelareorep

An immuno-oncolytic virus  
addressing unmet needs across a  
broad range of indications



# Pelareorep can overcome the shortcomings of ICIs

The ICI market is expected to reach \$25B by 2022, yet less than 1 in 5 patients respond to these therapies  
**Clinical data suggest that pelareorep treatment can reverse ICI resistance mechanisms**

## Resistance Mechanisms of Immune Checkpoint Inhibitors

Low tumor PD-L1 expression

Lack of pre-existing T cells

Lack of T cell expansion and mobilization



## Immune Activating Effects of Pelareorep

Upregulates tumor PD-L1 expression

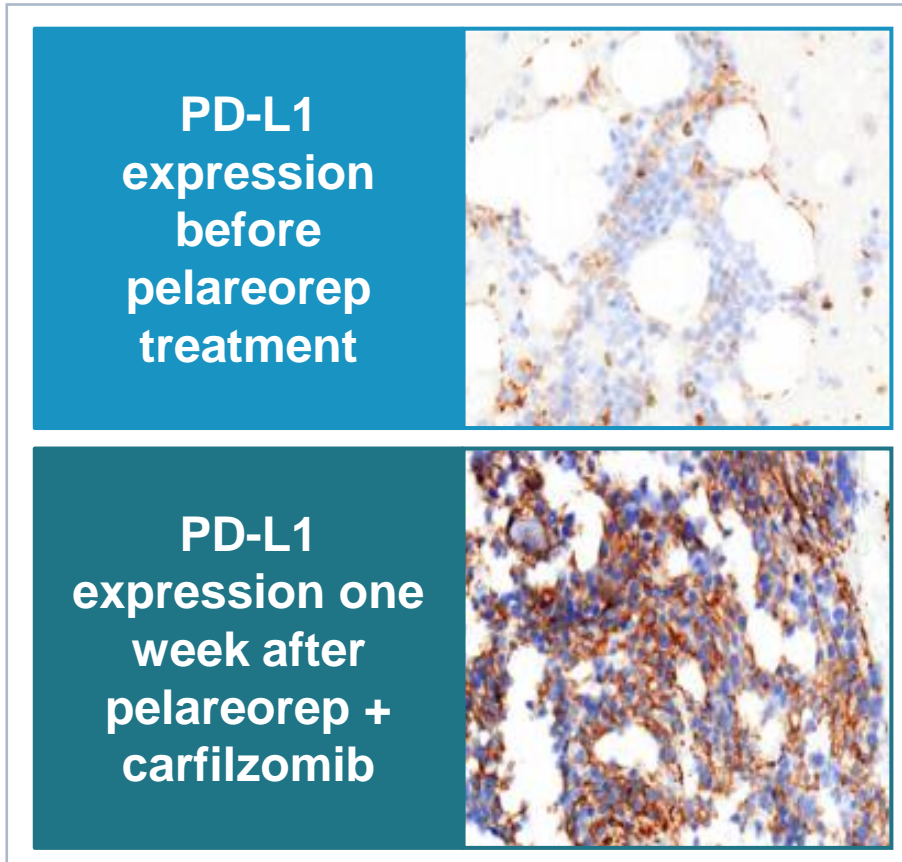
Generates new reactive T cell clones

Induces T cell expansion and tumor infiltration

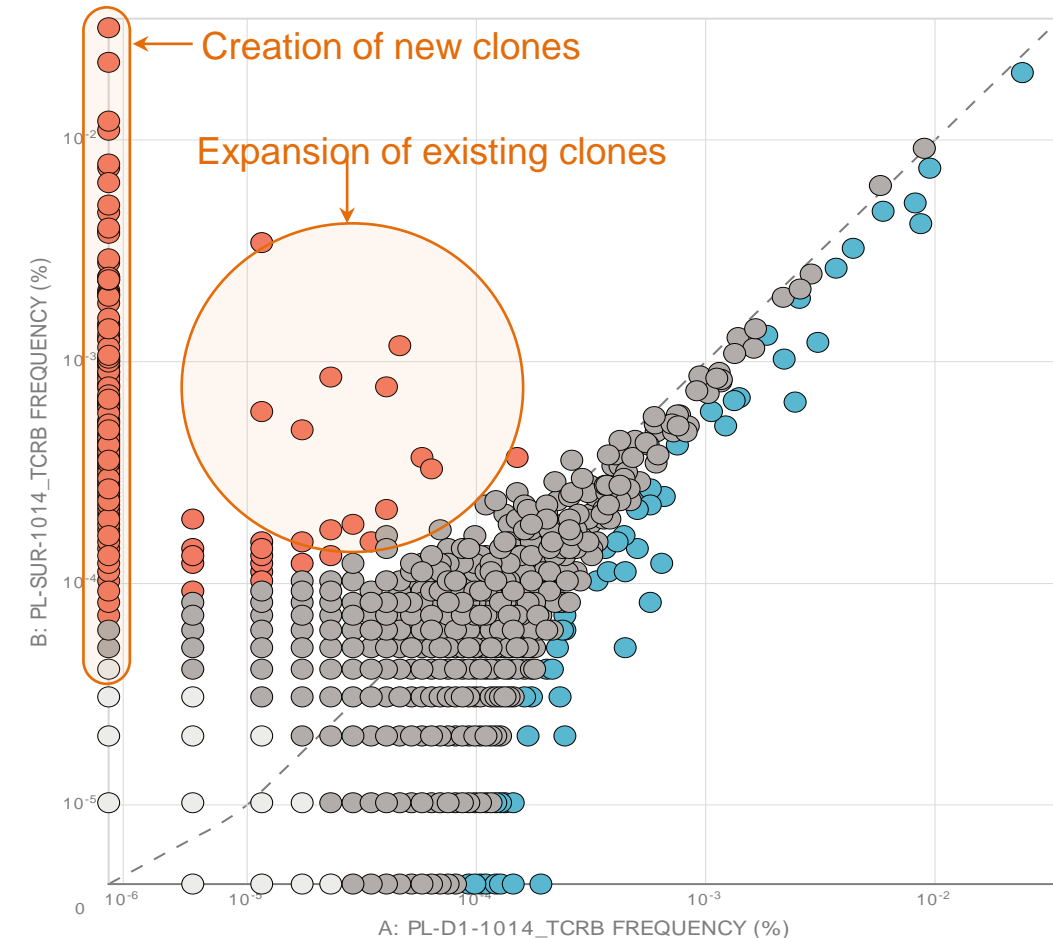




# Pelareorep has the potential to increase the proportion of patients that respond to ICIs



Brown staining indicates PD-L1 expression



Robust increase in tumor CD8+ T cells and PD-L1 expression seen with pelareorep treatment

# Pelareorep: An IV administered immuno-oncolytic virus

## Selectively replicates in cancer cells following IV delivery

Other immuno-oncolytic viruses require intratumoral delivery

## Accesses both primary and metastatic disease

As shown in multiple clinical studies

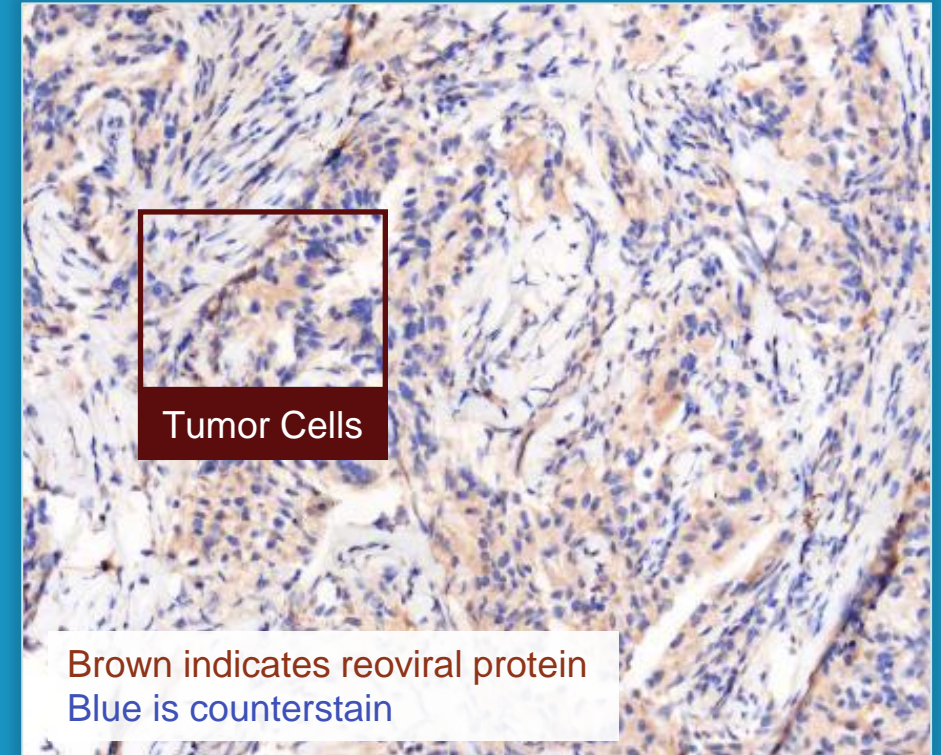
## Unarmed virus with BSL 2 classification

Does not require the special handling or administration practices needed for BSL 3 viruses

## Predictive and prognostic biomarkers identified

Peripheral T cell clonality (measure by TCR sequencing)  
CEACAM6 (measure by immunostaining)

## Selective Replication in Tumor Cells

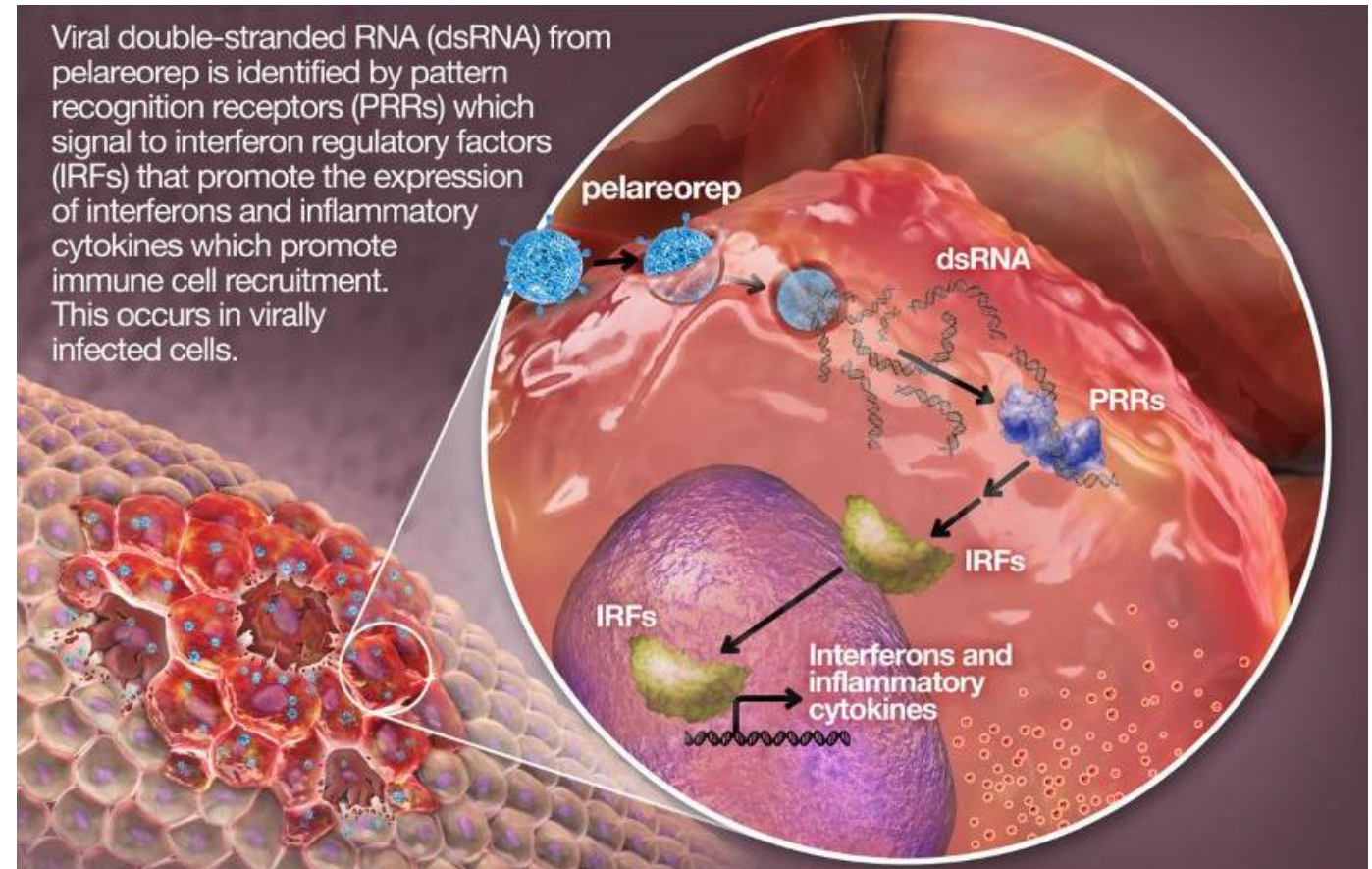


Pelareorep offers substantial competitive advantages over other immuno-oncolytic viruses

## Intravenous administration of pelareorep leads to

- Selective replication in cancerous cells with accumulation of dsRNA
- Promotion type 1/2 interferon signaling via pattern recognition receptors such as RIG-I and TLR3
- Activation of natural killer (NK) cells, dendritic cells, and T cells

**MORE THAN 40**  
supporting publications



# Pelareorep is safe and well tolerated



- 1,100 patients treated, 900+ intravenously

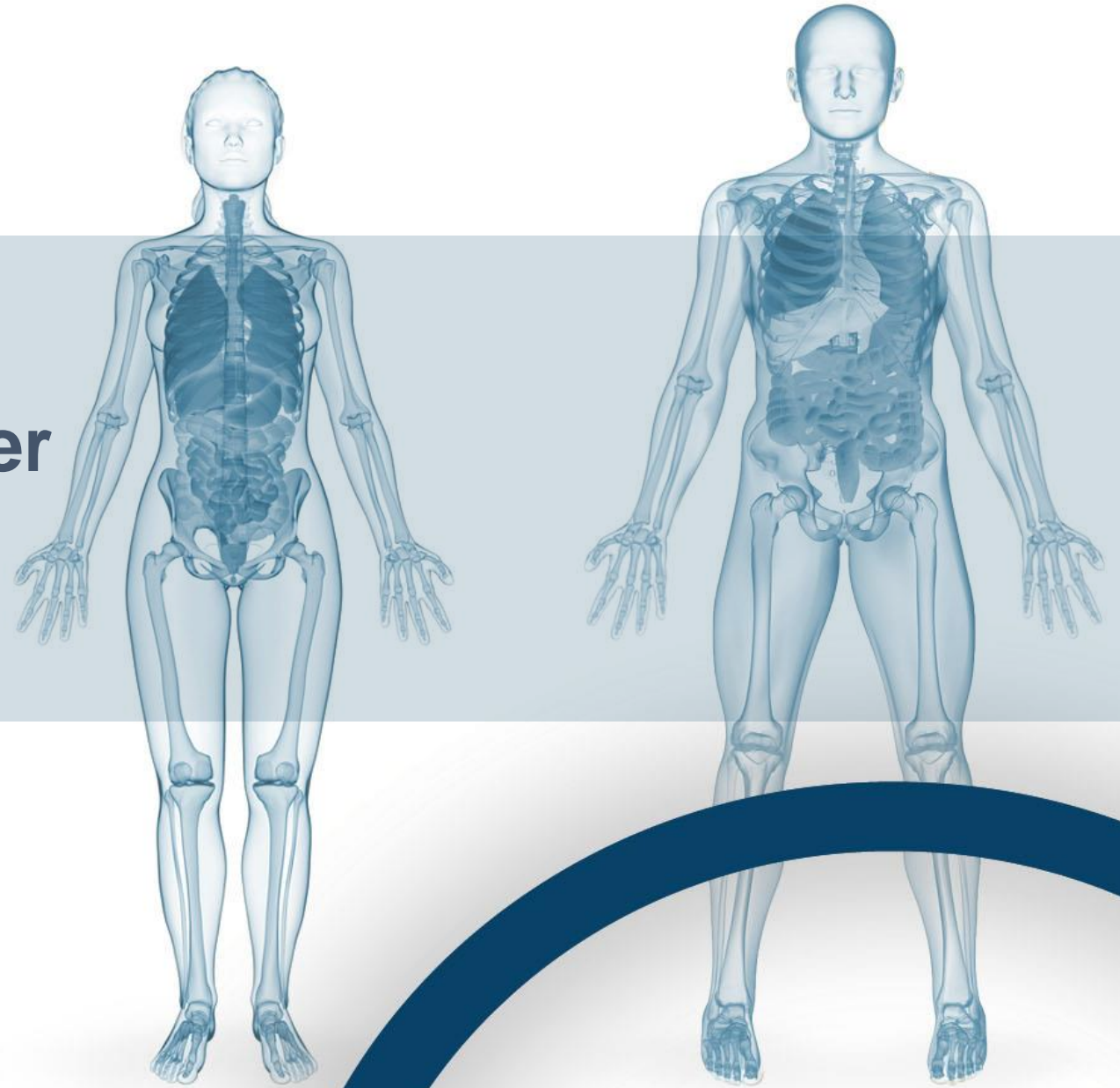
## Monotherapy Toxicity Symptoms

- Toxicities have generally been mild (grade 1 or 2) and included chills, fever, headache, cough, myalgia, runny nose, sore throat, fatigue, lymphopenia or neutropenia
- Transient toxicities (grade 3 or 4) also included lymphopenia or neutropenia
- Symptoms usually last < 6 hours

No maximum tolerated dose has been reached to date

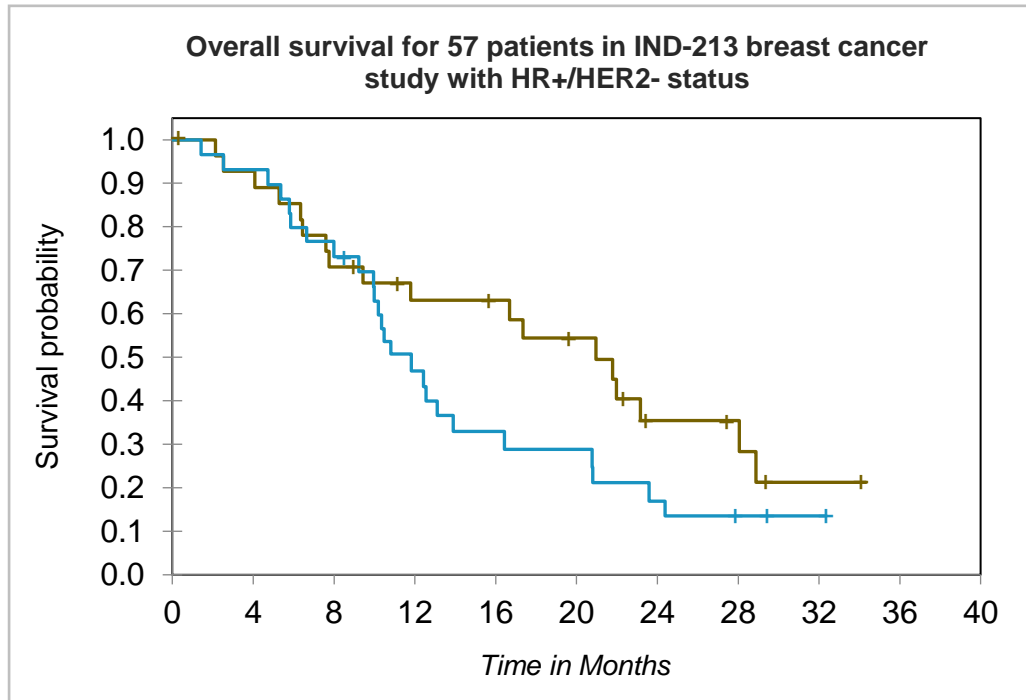
# Pelareorep in Breast Cancer

Lead Indication



# Efficacy data from prior successful randomized study support success in BRACELET-1

## Phase 3 Patient Population: Nearly doubled OS in HR+/HER2-

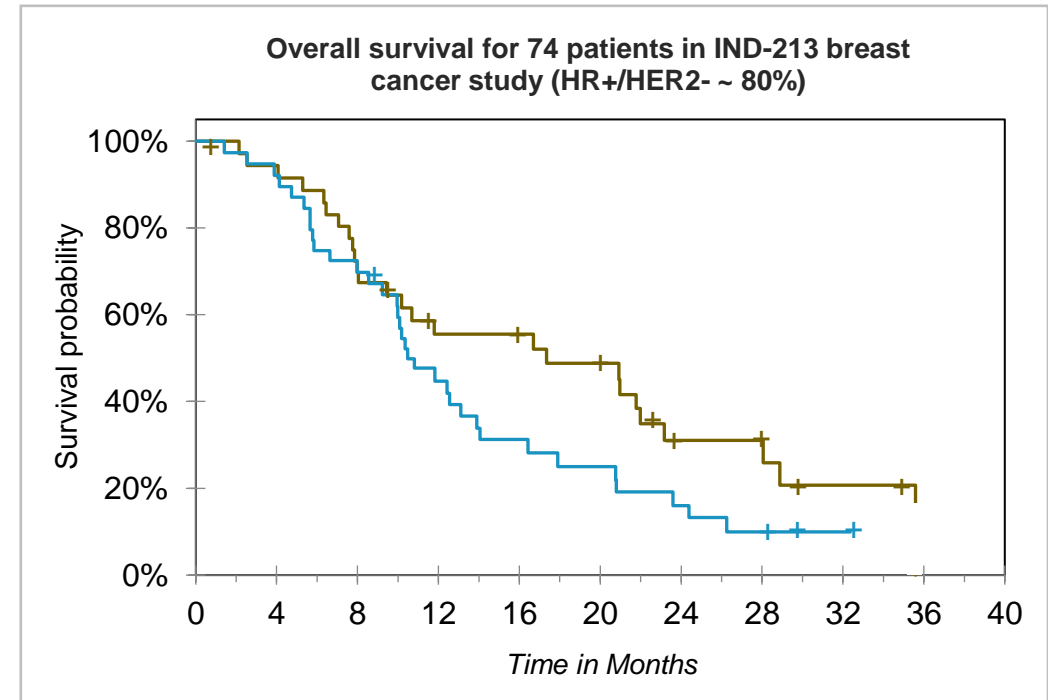


**Test Arm**  
(paclitaxel + pelareorep)

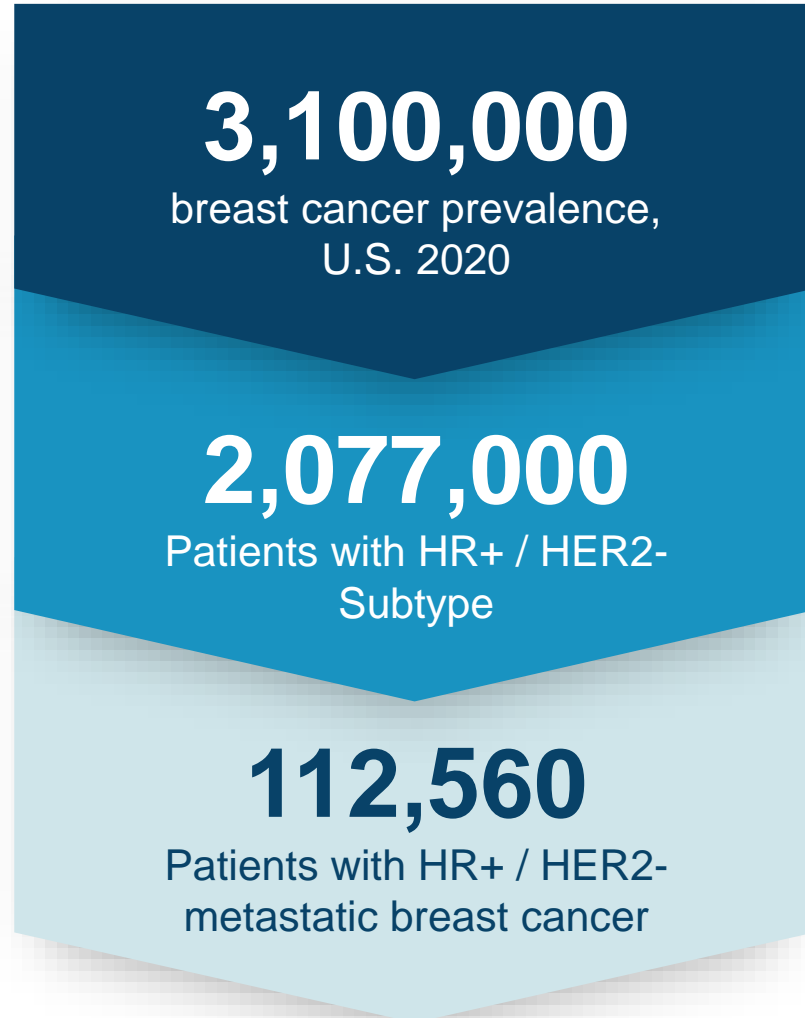
**Control Arm**  
(paclitaxel)

HR	= 0.60
p	= 0.1 (powered to 90%)
Median OS	= 10.8 months vs 21.0 months
Test	n= 28
Control	n= 29

## Phase 2 Intent To Treat: Statistically Significant Improvement in OS



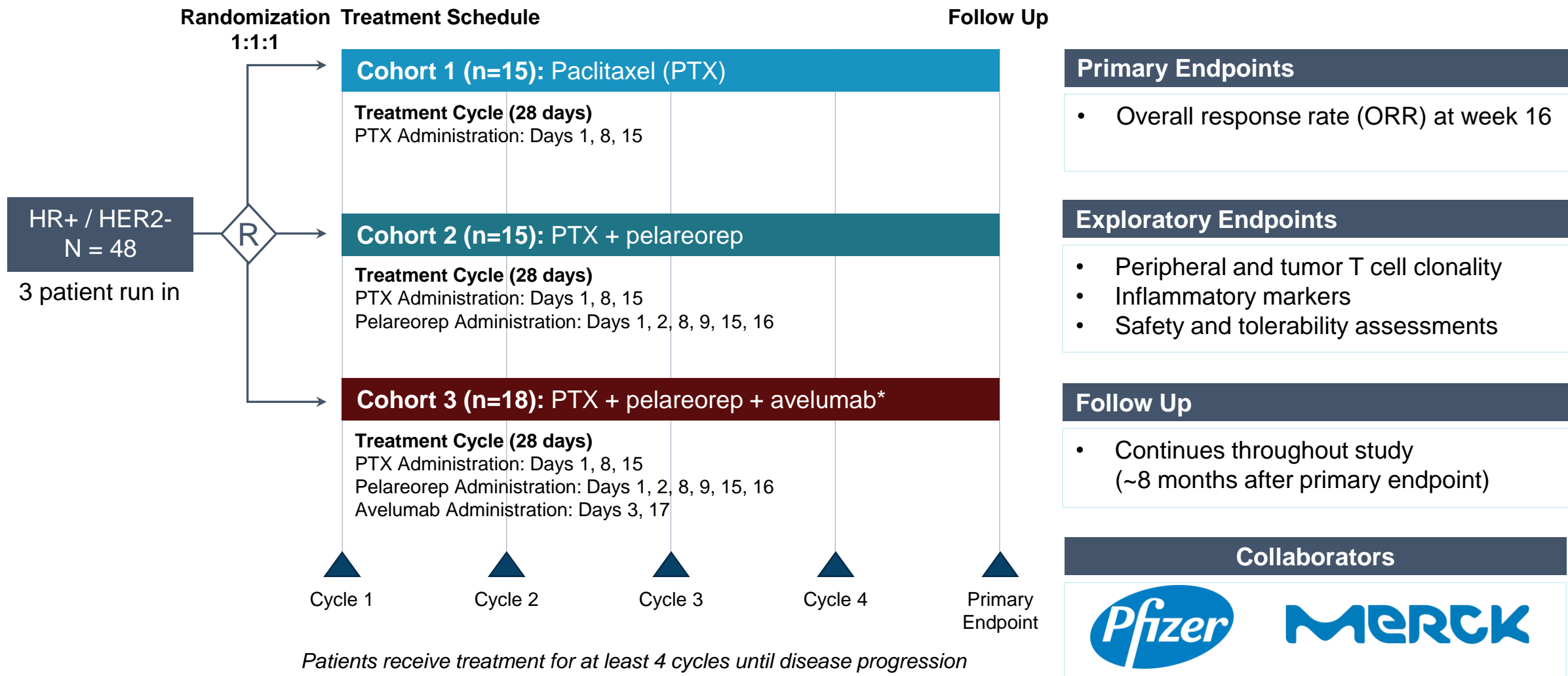
HR	= 0.65
p	0.1 (powered to 90%)
Median OS	= 10.35 months vs. 17.35 months
Test	n=36
Control	n=38



## Severe limitations in the SOC

Currently approved therapies are  
unable to produce a meaningful  
survival advantage

# BRACELET-1 phase 2 study evaluates efficacy of pelareorep-based combination therapies





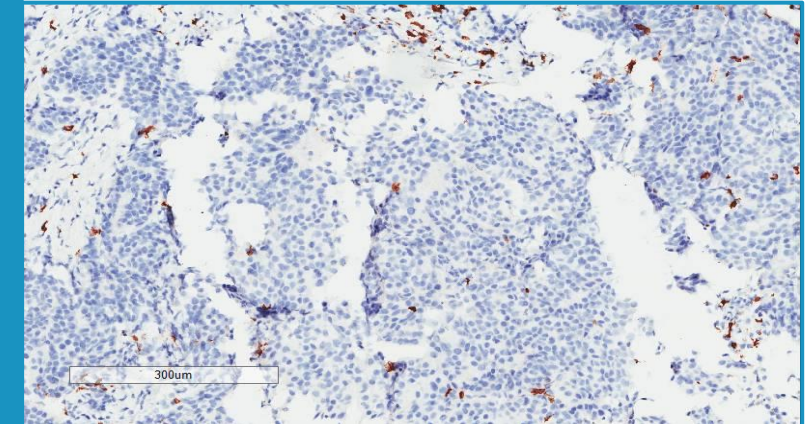
# Preliminary AWARE-1 biomarker data support success in BRACELET-1

## AWARE-1 Window of Opportunity Study Design

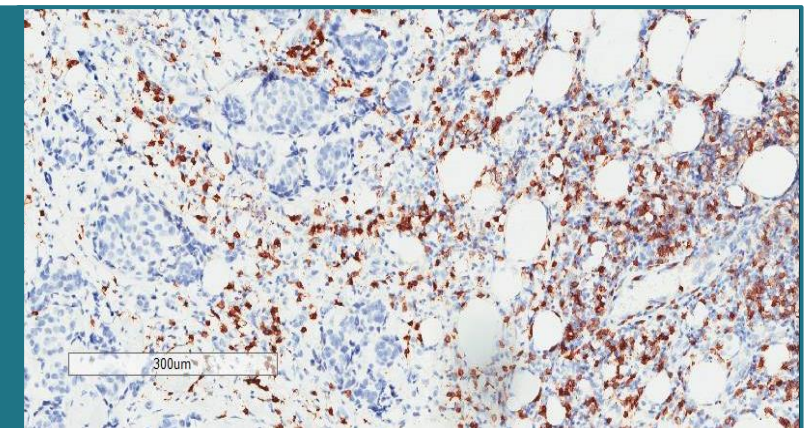
- Open label study in early stage breast cancer
- Enrolling patients in five cohorts:
  1. <sup>a</sup>HR+/HER2- (cohort completed)
  2. <sup>b</sup>HR+/HER2-
  3. <sup>c</sup>TNBC
  4. <sup>d</sup>HR+/HER2+
  5. <sup>e</sup>HR-/HER2+
- Combines the appropriate intervention for each patient's breast cancer sub-type, plus pelareorep, with or without atezolizumab (Tecentriq®), followed by surgery
- Paired biopsies are collected before and after treatment
- Primary endpoint:
  - Overall CeTIL (measure of tumor inflammation)
- Key secondary endpoints:
  - Safety
  - Tumor and blood-based biomarkers

## Pre vs. Post Treatment CD8+ T Cell Infiltration

CD8+ T cell staining before pelareorep treatment



CD8+ T cell staining ~3 weeks after pelareorep treatment



Brown staining shows CD8+ T cells

## Signal of Efficacy in Metastatic Breast Cancer

- Statistically significant phase 2 OS data in 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> line patients

## Positive Regulatory Feedback Received:

- Favorable FDA End-of-Phase 2 Meeting
- Favorable EMA Final Advice Letter
- Fast Track Designation
- Special Protocol Assessment Agreement

## Encouraging Preliminary AWARE-1 Data:

- PD-L1 upregulation with pelareorep treatment

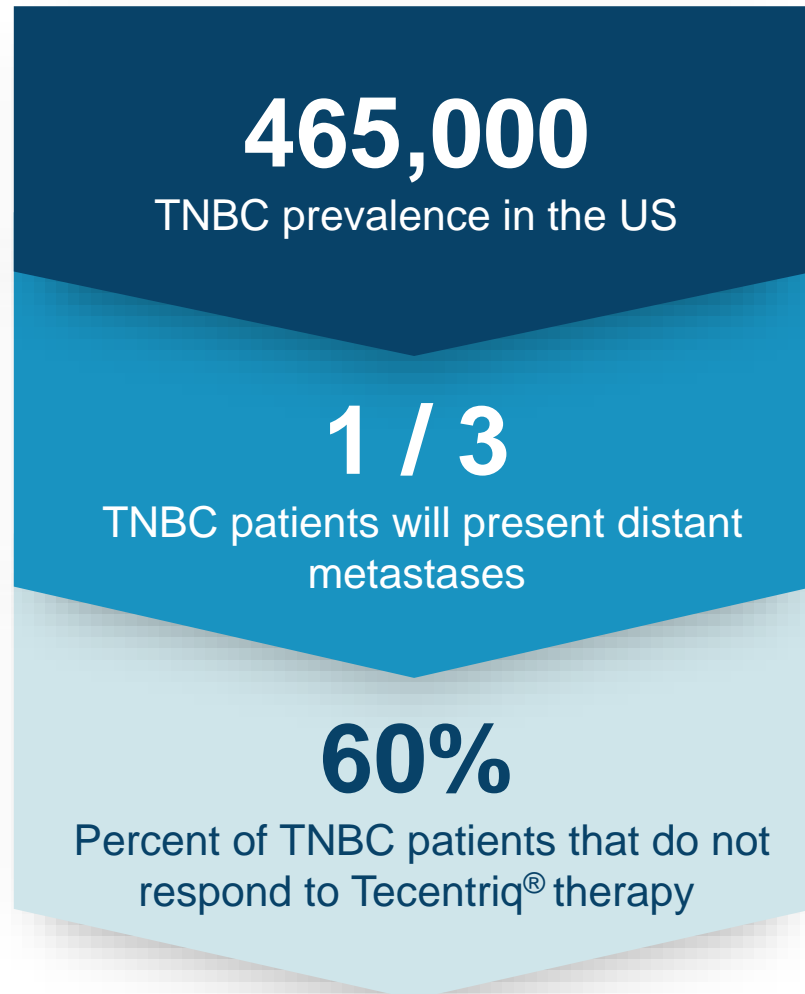
## Moving Toward a Pivotal Study

### Next Steps

Determine if positive phase 2 results can be enhanced by the addition of a checkpoint inhibitor

Confirm pelareorep's immunotherapeutic MOA

Confirm biomarker to facilitate phase 3 trial success



**\$1B**

Value of Tecentriq®  
franchise in TNBC patients

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Clinical data suggest  
pelareorep can increase  
the proportion of patients  
eligible for checkpoint  
inhibitor therapy

Sources:

FiercePharma, December 6, 2018

Marriotto et al. Estimation of the Number of Women Living with Metastatic Breast Cancer in the United States. Cancer Epidemiol Biomarkers Prev. May 18, 2017.

Caparica R, et al. ESMO Open 2019;4:e000504. doi:10.1136/esmoopen-2019-000504

Roche Pharma Day 2019 – corporate presentation

# IRENE Study Evaluates the Efficacy of Pelareorep-anti-PD-1 Combination Therapy

## Screening Period

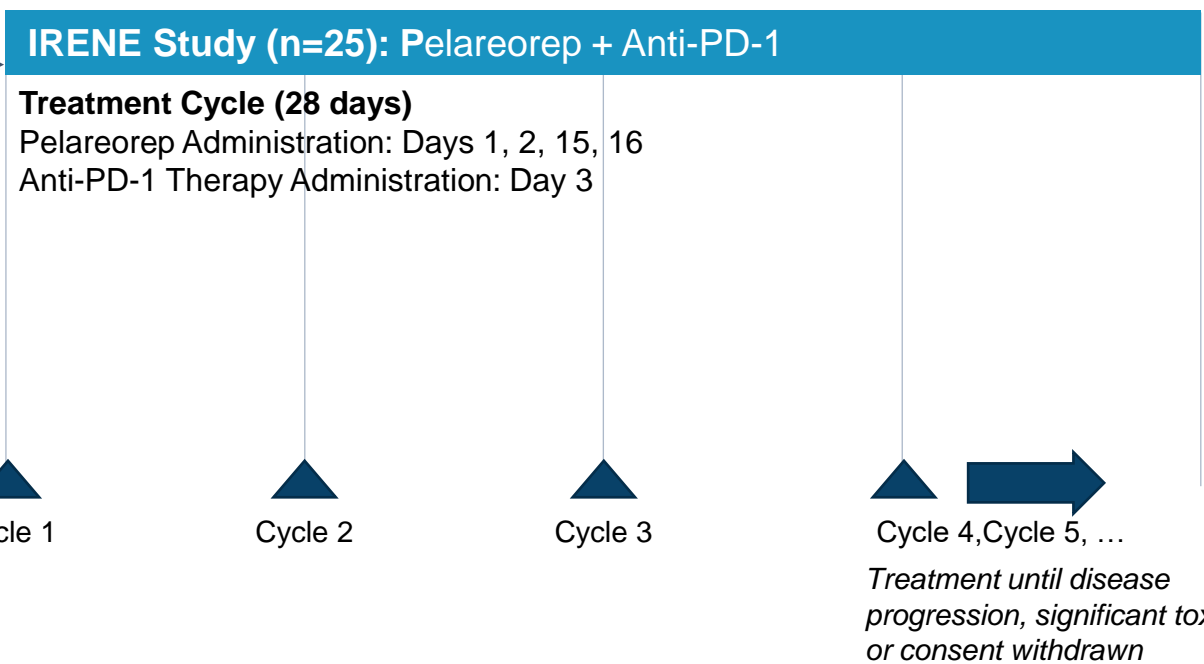
**TNBC N =25**

**Key Inclusion Criteria**

- Metastatic TNBC
- Progressed after 1-2 prior lines of therapy
- Adequate organ function
- ECOG PS 0-2

Day -28 to Day -1

## Treatment Schedule



## Follow Up

- Safety Follow Up**
- 30 day
- Long-term Follow Up**
- 90 days
  - 6 months
  - 12 months
  - 18 months
  - 24 months

**Primary Endpoints**

- Safety
- Objective response rate

**Secondary Endpoints**

- PFS
- OS
- Duration of response

**Exploratory Endpoints**

- Peripheral T cell clonality
- Pre- vs. post-treatment change in tumor PD-L1 expression

## BRACELET-1

- First patient dosed in Q2 2020
- Confirm efficacy and MOA of pelareorep in HR+/HER2- mBC
- Confirm T cell clonality as a biomarker of pelareorep response to facilitate the success of future pivotal studies
- Determine potential added efficacy of checkpoint inhibitor



## AWARE-1

- Interim data presented in Q2 2020
- Validate pelareorep's immunotherapeutic MOA in additional patients
- Confirm T cell clonality as a biomarker of pelareorep response to facilitate the success of future pivotal studies

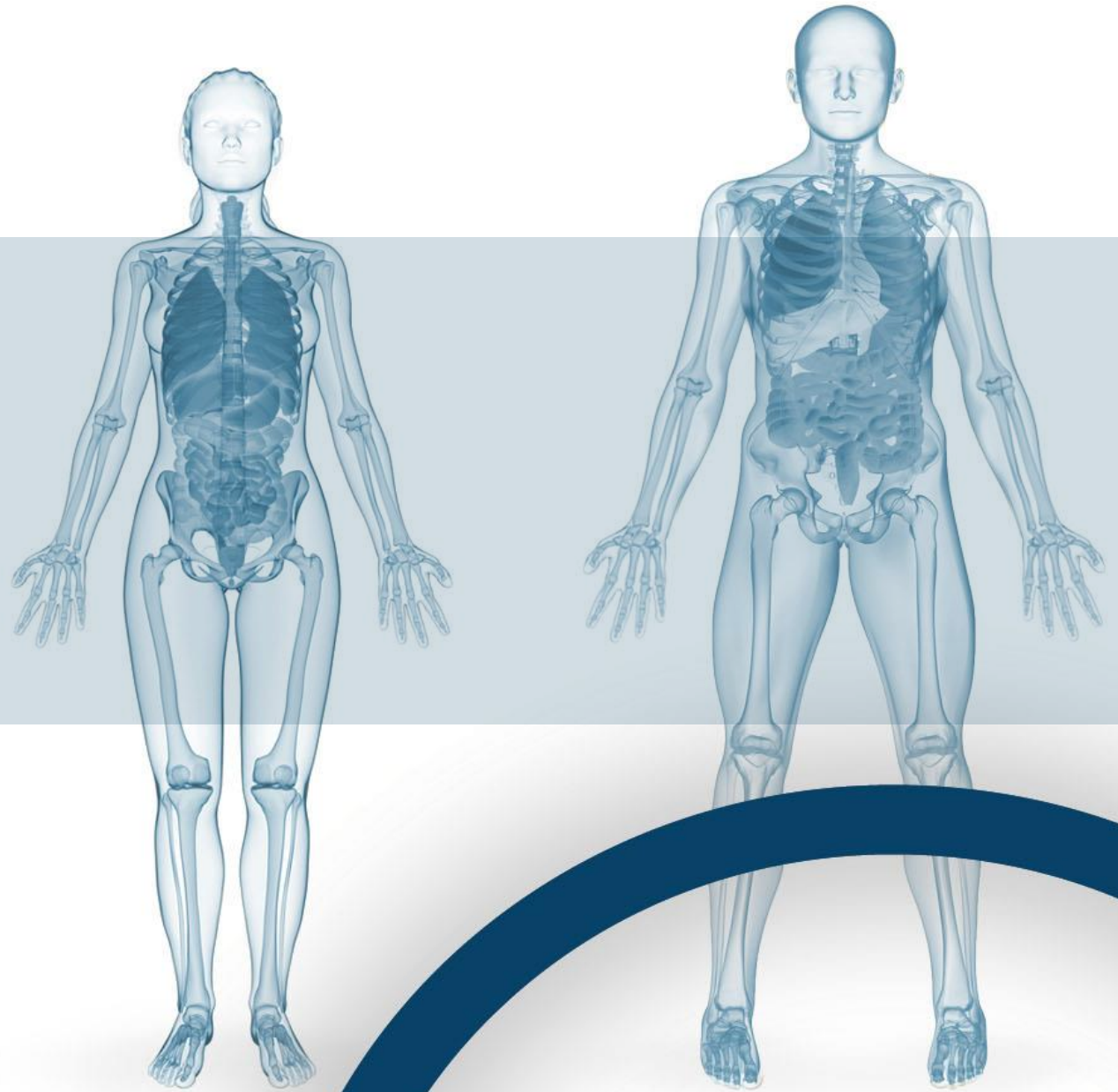


## IRENE

- First patient dosed in Q3 2020
- Evaluate efficacy of pelareorep-anti-PD-1 therapy in TNBC
- Confirm T cell clonality as a biomarker of pelareorep response to facilitate the success of future pivotal studies



# Leveraging an Inflamed Phenotype Gastrointestinal Cancers & Hematologic Malignancies



**4.8M**

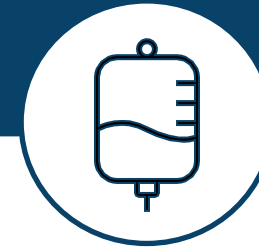
Estimated number of new GI cancer cases worldwide in 2018

**3.4M**

Estimated number of GI cancer-related deaths in 2018

**26%**

GI cancers account for 26% of global cancer incidence



## Limitations in the SOC

Current treatment options address only small subtypes of GI cancers

Though ICI is approved for certain GI cancers, less than half of patients respond to ICI monotherapy

# Pancreatic Cancer Phase 2 Study Design

## Screening Period

### Key Inclusion Criteria

- Histologically confirmed advanced pancreatic adenocarcinoma
- Documented objective radiographic progression
- Failed or did not tolerate first-line therapy

## Treatment Schedule

### Combination Study (n ≤ 30): Pelareorep + Pembrolizumab

#### Treatment Cycle (21 days)

Cycle 1:  
 Pembrolizumab IV over 30 minutes on day 1  
 Pelareorep IV over 60 minutes on days 1, 2, 3, and 8

Cycles 2, 3, 4, ...:  
 Pembrolizumab IV over 30 minutes on day 1  
 Pelareorep IV over 60 minutes on days 1 and 8

Cycle 1

Cycle 2

Cycle 3

Cycle 4, Cycle 5, ...

*Cycles repeat every 21 days for up to 24 months*

### Primary Endpoints

- ORR by iRECIST

### Secondary Endpoints

- Confirmation of blood draw biomarkers
- PFS
- mOS

## Previous Pancreatic Study

### REO 024: Combination with Keytruda® (plus PI's choice of chemotherapy)

- Two patients with SD: 126 and 277 day
- One patient with PR lasting 504 days (35 cycles)
- On treatment biopsy: infection in cancer cells and immune infiltrates

Biomarker correlates with PFS at baseline ( $HR=0.05, p=0.01$ )

Biomarker correlates with OS at baseline ( $HR=0.12, p=0.01$ )

Biomarker correlates with OS after one cycle ( $HR=0.08, p=0.01$ )

## Collaborators





# Clinical data highlight the potential of pelareorep-checkpoint inhibitor combination therapy in GI cancer

## **Clinical data from colorectal and pancreatic cancer studies suggest pelareorep has significant potential to synergistically increase the effectiveness of immune checkpoint inhibitors in GI cancers**

- Rapid maturation of dendritic cells after pelareorep treatment
- Increase in activation of CD8+ cells after pelareorep treatment
- Upregulation of PD-L1 in tumor cells following pelareorep treatment

## **Predictive and prognostic biomarker candidates have been identified in a pancreatic cancer study**

- T cell clonality - candidate biomarker of response
- CEACAM6 - candidate biomarker of resistance

# Improved treatments for hematologic malignancies such as multiple myeloma are needed

**2<sup>nd</sup>**

Multiple myeloma is the 2<sup>nd</sup> most common hematologic malignancy

**354,000**

Estimated number of MM cases in the 8 major markets\* in 2017

**40%**

Of cases in the 8 major markets were in the U.S. in 2017



## Limitations in the SOC

Current treatment options in the relapsed or progressive disease setting are limited

Refractory patients often exhaust all available treatment options

**Clinical data demonstrate pelareorep's potential to synergistically combine with proteasome and/or immune checkpoint inhibitors in the treatment of hematologic malignancies**

## Proof-of-Concept Clinical Data

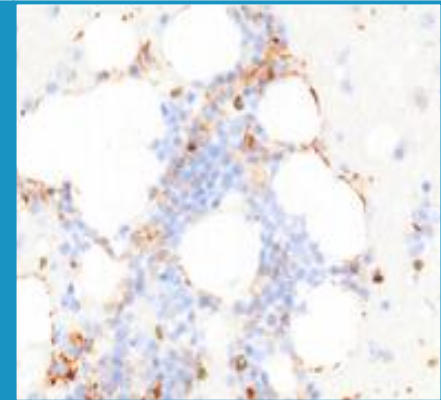
Pelareorep targets and selectively replicates in MM tumor cells

Achieved a 50% ORR and 83% CBR in patients who have failed carfilzomib

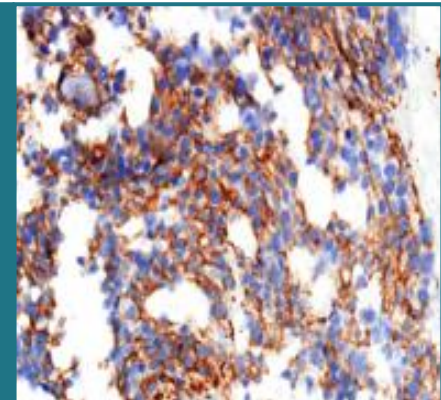
Observed T cell activation and the first report of cytokine storm associated with tumor response in MM

Saw PD-L1 upregulation with pelareorep treatment

PD-L1  
expression  
before  
pelareorep  
treatment

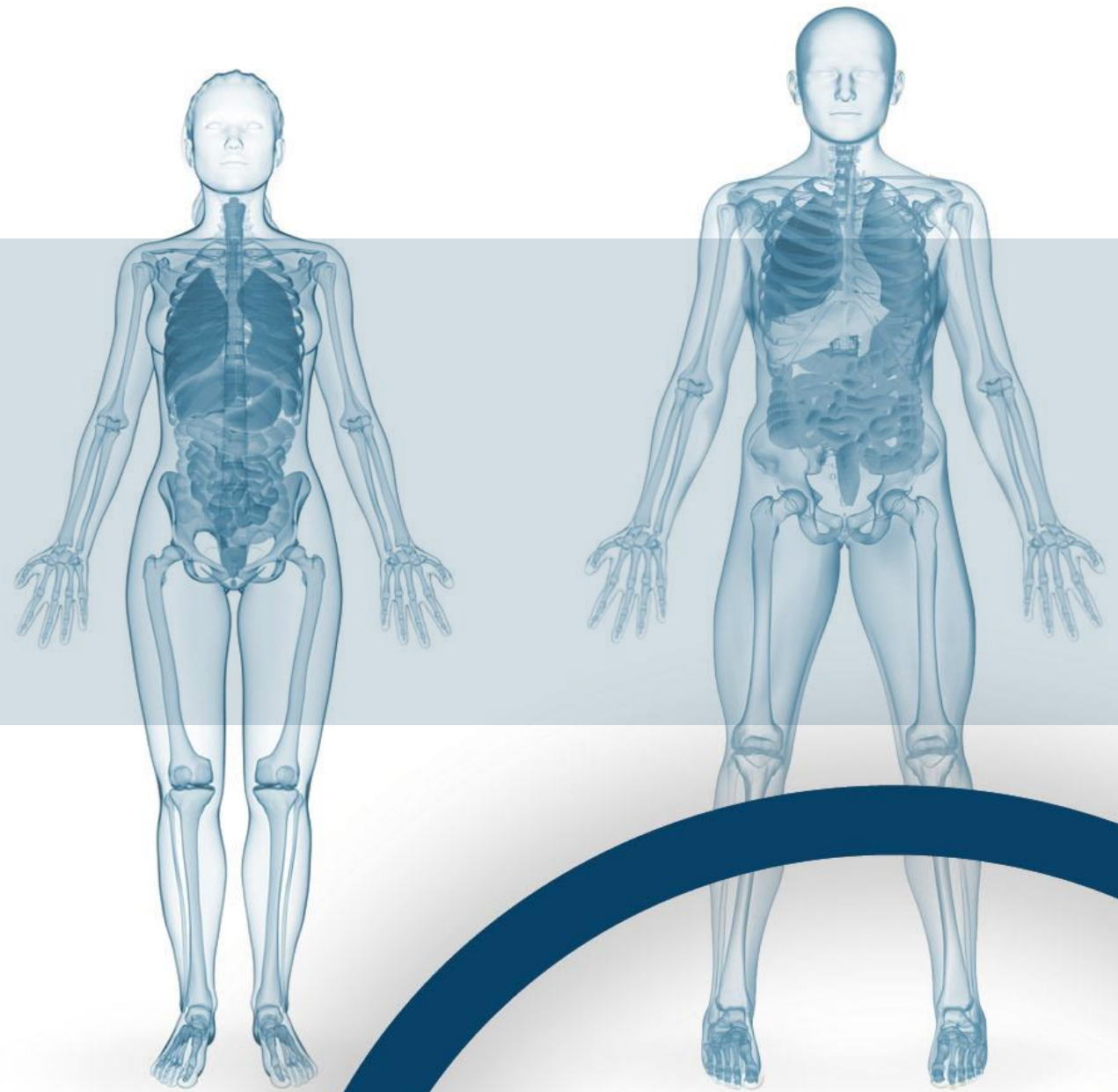


PD-L1  
expression one  
week after  
pelareorep +  
carfilzomib



Brown staining indicates PD-L1 expression

# Corporate



# Business development strategy anchored by partnerships with large pharmaceutical companies

## Objective: Joint Development and Commercialization Partnership

- Support of breast cancer registration study as well as other potential registration opportunities
- Financial and clinical support for other company-sponsored and/or investigator-sponsored studies
- Expansion of indications
- Improved ability to meet timelines while lowering development and manufacturing costs
- Maintain rights in North America in part or in whole
- Out-license ROW rights

## Co-Development Study

- Co-development agreement with **Pfizer/EMD Serono** to evaluate Bavencio® in 2L mBC

## Oncolytics or Investigator Sponsored Trials (IST's)

- 4 ongoing combination studies with **Merck, Roche & Bristol-Myers Squibb**

## Monetize Certain Geographies

### Successful partnership with Adlai Nortye

- China, Hong Kong, Macau, Singapore, South Korea and Taiwan
- Upfront and milestone payments of up to \$86.6M
  - \$21M in milestone payments largely under Oncolytics' control, with double-digit royalties
  - \$65M tied to potential development expansion

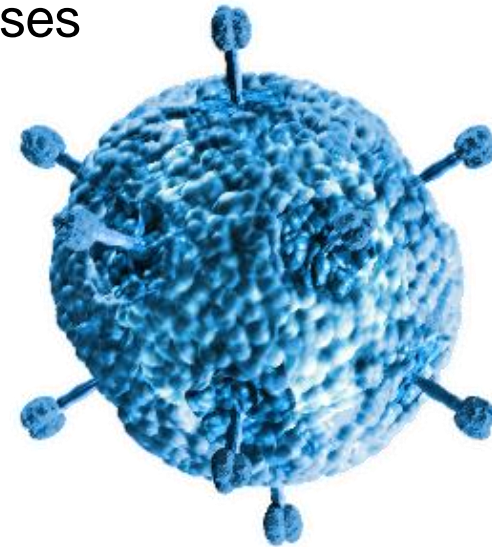
**396** patents issued worldwide, including **49** US and **19** Canadian

Over **13** pending applications worldwide

## Reovirus issued patent claims cover:

- Compositions of matter comprising reovirus
  - Through 2028 and extendable to 2033
- Pharmaceutical use of reoviruses to treat neoplasia and cellular proliferative diseases
- Combination therapy with radiation, chemotherapy and/or immune-suppressants
- Methods for manufacturing reovirus and screening for susceptibility to reovirus
- Pharmaceutical use of reoviruses in transplantation procedures

**Eligible for 12 years of U.S. market exclusivity upon approval**



Catalysts & Milestones	Combination With	Timing
AWARE-1 breast cancer study: interim biomarker data (ESMO)	Roche / Tecentriq®	Achieved
Phase 1 NCI-9603 multiple myeloma study: interim data (ASCO)	Kyprolis®	Achieved
Phase 2 NU 18I01 second line pancreatic cancer study: interim data (ASCO)	Merck / Keytruda®	Achieved
Initiate phase 2 BRACELET-1 study in HR+ / HER2- mBC	Pfizer & Merck KGaA / Bavencio®	Achieved
Initiate phase 2 IRENE study in TNBC	Incyte / Retifanlimab	Achieved
Phase 2 NU 18I01 second line pancreatic cancer study: final data*	Merck / Keytruda®	H1 2021

Anticipated Catalysts & Milestones	Combination With
Phase 2 BRACELET-1 metastatic breast cancer study: interim safety update	Pfizer & Merck KGaA / Bavencio®
AWARE-1 breast cancer study: final biomarker data	Roche / Tecentriq®
Complete enrollment in BRACELET-1 metastatic breast cancer study	Pfizer & Merck KGaA / Bavencio®
Phase 2 BRACELET-1 metastatic breast cancer study: final data	Pfizer & Merck KGaA / Bavencio®
Phase 1 WINSHIP 4398-18 multiple myeloma study: interim data	Bristol-Myers Squibb / Opdivo®

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Demonstrated synergies with immune checkpoint inhibitors

Safe and well tolerated: tested in over 1,000 patients

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Supported by compelling clinical data from a randomized phase 2 study showing a near doubling of OS with pelareorep treatment

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## Diversified pipeline with programs in GI cancers and hematologic tumors

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Multiple myeloma: Ongoing phase 1 trials evaluating pelareorep in combination with carfilzomib alone and in combination with carfilzomib + nivolumab

## Synergy with ICI's: multi-billion-dollar market opportunity

ICI market is expected to exceed \$25B by 2022<sup>1</sup>

As few as 1 in 5 patients respond to ICI therapy

Robust clinical and pre-clinical data demonstrate pelareorep's potential to increase the proportion of patients responding to ICIs



